This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

LANE MEDICAL LIBRARY STANFORD
L204 .R51h 1893 2 STOR
Whooping-cough / translated by Joseph He
24503442175

Richardière, Henri Alphonse.

Whooping-cough.

L204
R51h
vol.2
1893

LANE

MEDICAL LIBRARY

SEAL OF THE LELAND STANFORD JUNIOR UNIVERSITY
SEMPER VIRENS
1885

GIFT
SHRINERS' HOSPITAL

AMERICAN BANK NOTE CO. LITHO

WHOOPING-COUGH

BY

DR. H. RICHARDIÈRE,

PARIS, FRANCE.

TRANSLATED BY JOSEPH HELFMAN.

VOLUME II.

1893.
GEORGE S. DAVIS,
DETROIT, MICH.

Copyrighted by
GEORGE S. DAVIS.
1898.

LAWE LIBRARY

CONTENTS OF VOLUME II.

	Page
Thoracic Complications	77
Laryngeal Complications	90
Nervous Complications	92
Complications of the Mouth	98
Secondary Infections	99
Forms of Whooping-Cough	107
Prognosis of Whooping-Cough	113
Diagnosis of Whooping-Cough	118
Pathological Anatomy	125
Nature of Whooping-Cough	131
Treatment of Whooping-Cough	135
Treatment of Symptoms	152

WHOOPING-COUGH.

THORACIC COMPLICATIONS.

The thoracic are the most frequent complications of whooping-cough, and are of peculiar importance by reason of their gravity.

Before proceeding to study the consequences of an inflammatory condition of the thoracic organs, it is proper to say that sometimes, in the absence of any appreciable complication, an intense whooping-cough causes death by the very difficulty of respiration and by disturbances of hæmatosis. The fatal termination is then due to progressive asphyxia, no lesion of the thoracic organs being produced.

Death from asphyxia is observed in very intense whooping-cough when the paroxysms are incessant and will not permit adequate respiration. In ordinary attacks of the disease, asphyxia threatens during the paroxysms when normal respiration is suspended; but the paroxysms once ended, respiration is restored; hæmatosis, momentarily interrupted, may proceed, for its arrest is intermittent and brief. It is quite different when the paroxysms are abnormally prolonged and repeated; hæmatosis can no longer proceed as under normal conditions; the dyspnœa is continued; and the child, becoming gradually enfeebled, succumbs with all the symptoms of progressive asphyxia,

though there be no complication due to an organic alteration of the respiratory apparatus.

This mode of termination in grave whooping-cough, indicated by Guéneau de Mussy, is rare. Most commonly the asphyxia is caused by a morbid modification constituting a veritable complication.

Bronchitis.—Bronchitis is one of the ordinary elements of whooping-cough. Catarrhal inflammation of the bronchi always exists during the first period, and generally attends the malady to its conclusion. Frequently the symptoms of bronchitis are alone appreciable.

During the second period, complete absence of bronchitis is rarely observed, the latter commonly manifesting itself to auscultation by snoring and sibilant râles. Bronchitis, accordingly, accompanies whooping-cough during a great part of its evolution, and cannot, indeed, be considered as a complication save when of abnormal intensity; it then exaggerates the bronchial secretion and thus augments the number of paroxysms.

Intense bronchitis is recognized by auscultation of the chest. Continual snoring and sibilant râles are heard in great number, if the large bronchi are alone invaded; subcrepitant râles, if the inflammation has extended to the lesser bronchi. Intense bronchitis often produces elevation of the temperature and more or less marked dyspnœa, in accordance with its gravity and extent.

Bronchitis, commonly without serious prognosis, must be watched, for at any time it may be followed by broncho-pneumonia.

In most instances the bronchitis of whooping-cough is limited to the large and medium bronchi. In some rare cases, and particularly in certain epidemics, it gains access to the lesser bronchi and thus gives rise to a suffocative catarrh. The bronchitis then assumes an extreme gravity and rapidly carries off the patients, who succumb after presenting the classic symptoms of capillary bronchitis.

Bronchitis, as a complication of whooping-cough, sometimes supervenes without appreciable cause, being apparently due to the infection. Most frequently it is caused by an accidental circumstance such as a premature venture out of doors, or a chill.

Broncho-pneumonia.—This is the most formidable complication of whooping-cough. Its frequency has been the subject of different estimates by writers, varying widely according to the epidemics and the scene of its action, and depending principally on the gravity of the disease. Rare and even exceptional in whooping-cough of slight intensity, broncho-pneumonia is frequent where the paroxysms are violent and repeated. The surroundings are of prime importance. Broncho-pneumonia is rare in urban practice; it is frequent in the hospitals, where it sometimes rages epidemically in the halls where the whooping-cough subjects are isolated. When it rav-

ages a community where whooping-cough prevails, it is particularly formidable, for it may seize upon children whose mild form of whooping-cough would seem to promise immunity against this complication. It then assumes the manner of a contagious malady, and may be compared to the broncho-pneumonia which supervenes as a complication of measles.

Generally speaking, broncho-pneumonia ensues as a complication in one-fifth the total number of whooping-cough cases of whatever intensity (Joffroy). In a review of 431 cases of whooping-cough, H. Roger cites 68 cases of pneumonia and broncho-pneumonia. Of these 68 cases, 51 resulted fatally.

Certain secondary causes favor the development of broncho-pneumonia:

Age, first. The younger the child, the more frequent the broncho-pneumonia, being extremely so among children at the breast. Up to the age of two years it is still frequent—in such degree that in children of less than two years the appearance of broncho-pneumonia may be apprehended, even though the whooping-cough be one of slight intensity (Desruelles, Damaschino).

Cold and humid seasons play a certain part in favoring the appearance of bronchitis *à frigore*, which, at a given moment, may be complicated with broncho-pneumonia.

Its development is not influenced by temperament, although certain writers declare it more frequent in feeble children.

Prior thoracic affections predispose to broncho-pneumonia. The same is true of intercurrent infectious maladies, especially of measles. When whooping-cough is complicated with measles, broncho-pneumonia is almost invariably mortal (H. Roger).

The influence of cold, regarded as incontestable by ancient authors, seems doubtful. The cold does not seem to act save in favoring the bronchitis which may be finally complicated with lobular pneumonia.

At what period of whooping-cough does broncho-pneumonia develop? It is exceptional during the first period, not being then observed save occasionally among new-born infants. It is almost always observed during the second period when the paroxysms are in full development. During this period, also, its frequency varies according to the age of the malady. Rare during the first week, it is specially frequent during the second and third weeks. Later on it becomes much less frequent, and is altogether exceptional during the last period, when it occurs only by accident—if another infectious malady supervene, notably measles.

The *début* of broncho-pneumonia is most commonly insidious, and its appearance is marked by two principal symptoms: fever and dyspnœa.

The fever is generally intense from the outset. The temperature, but slightly elevated in uncomplicated whooping-cough, rises considerably from the *début* of broncho-pneumonia, the thermometer regis-

tering 39° to 40° C. and several tenths. The pulse, already accelerated in typical whooping-cough, becomes extremely rapid. It is not rare to count 140 or 150 pulsations from the outset. At the same time the skin is hot and dry. The visage is red and animated. The cheekbones are red or violet.

Dyspnœa prevails from the first days, revealing itself by movement of the nostrils—a well known and important indication of thoracic complication in the diseases of childhood. The movement of the nostrils sometimes renders it possible, ere any examination is made, to diagnose the existence of a broncho-pneumonia at its *début*, and it suggests the possibility of this complication when the pulmonary lesions, still central, are not perceptible to stethoscopic examination.

Dyspnœa manifests itself also by an augmented number of respirations — always considerable, — by distension of the veins of the neck, by the substernal and supersternal inspiratory sounds, by the purple color of the face.

The cough assumes special characteristics. The Hippocratic axiom, "Febris spasmos solvit," applied by Trousseau to the fever of broncho-pneumonia complicating whooping-cough, is not absolutely true of the cough and the paroxysms. And yet, if the supervention of a broncho-pneumonia does not suppress the paroxysms, it modifies their characteristic features; while remaining as frequent, they become

less violent. The cough grows dull and smothered. The whistling or sibilant access loses its peculiarities, often ceasing to be even perceptible (Rilliet and Barthez). The returning crises are briefer and less numerous. At the outset the paroxysm is still followed by expectoration; and in proportion to the want of vital power produced by the broncho-pneumonia the ejection of expectorated matters grows even more difficult. Subsequently expectoration diminishes and may even cease completely.

At the *début* of broncho-pneumonia physical examination of the chest yields little useful information. Later on, by percussion we may perceive the existence of dull zones, and, by auscultation, of subcrepitant râles and souffle. The broncho-pneumonia of whooping-cough has no other special physical signs beyond those observed in any broncho-pneumonia.

Its evolution as a complication of whooping-cough is generally rapid. Dyspnœa progresses steadily to a fatal termination, which is the common consequence of broncho-pneumonia in whooping-cough. Death, generally speedy, supervenes after a few days.

At times, however, cure may be effected when the lesions have been purely congestive and characterized as such by their mobility as revealed on stethoscopic examination.

The broncho-pneumonia of whooping-cough may be prolonged and become chronic. After an acute

phase of several days, marked by fever and dyspnœa, the temperature falls; convalescence promises to begin; but, after a brief remission, the evening temperature again rises, dyspnœa reappears, and presently are manifested the clinical symptoms of chronic broncho-pneumonia.

The chronic broncho-pneumonia of whooping-cough is most frequently attended with a considerable dilatation of the bronchi, imparting to it a special aspect, and producing veritable cavities or vomicas, with expectoration of a gangrenous odor. The general condition recalls that of tuberculosis. The emaciated children, profoundly cachectic, present continued dyspnœa. Fever prevails every evening.

Death is the termination of chronic broncho-pneumonia, and generally ensues after several months of cachexia.

When this complication assumes a chronic form, whooping-cough ceases to manifest itself by its habitual signs. The paroxysms disappear. The cough persists and is then related to the lesions of the dilated bronchi, not to the whooping-cough.

The expectoration accompanying this cough differs from that following the paroxysms, being formed of purulent matter of gangrenous odor; in this matter little plugs of mucus are found, similar to those described by Dietrich.

The broncho-pneumonia of whooping-cough is comparable, from an anatomical point of view, to

the other varieties of broncho-pneumonia. All the anatomical forms of broncho-pneumonia may be observed, the most frequent being the spleno-pneumonic form as described in Joffroy's thesis.

Kromayer, who studied the anatomical condition of three children, dead of lobular pneumonia as a result of whooping-cough, has described some interesting microscopical alterations. Two orders of lesions, he states, may be observed. In the first group the pulmonary alveoli contain round cells and detached epithelial cells; small quantities of blood and fibrin are there found; the alveolar spaces are enlarged; the connective tissue surrounding the bronchi is slightly modified and presents only rare leucocytes. In the second group the alterations are more interesting and explain the frequent passage of this broncho-pneumonia into a chronic state, as also the dilatation of the bronchi and the pulmonary cirrhosis resulting therefrom. In these broncho-pneumonias we see surrounding the foci an abundant proliferation of peri-bronchial and peri-vascular connective tissue. The walls of the alveolar ducts are thickened. In addition to this interstitial proliferation of the connective tissue, the endothelial cells of the alveoli are multiplied, become cubic and form circular or tubular trains. The supra- and intra-lobular bronchi are filled with cylindrical epithelial cells, with leucocytes and products of alveolar secretion.

The foci of broncho-pneumonia in the second

group are more numerous. Kromayer considers them as characteristic of this variety.

The analogy existing between the broncho-pneumonia of whooping-cough and the other varieties of secondary broncho-pneumonia, anatomically as well as clinically, warrants the supposition that it is due to the same pathogenic micro-organism, that is, to the streptococcus whose preponderating rôle in the pathogeny of the broncho-pneumonia of infectious maladies has been demonstrated by Mosny. It cannot be ascribed to the microbe held to be pathogenic of whooping-cough by Afanassiew and Wendt, for these authors have not found the *bacillus tussis convulsivæ* in the pulmonary lesions.

Like the other broncho-pneumonias of infectious maladies, that of whooping-cough is secondary and due to superadded infection. It seems to be conditioned by the streptococcus, whether this microbe proceed from the mouth or the first air-passages where it may exist amid normal conditions (Von Besser), or whether it be derived from the external air where it may be held in suspension, as demonstrated by the experiments of Straus and Wurtz. The presence of the streptococcus in the expired air accounts for the frequency of broncho-pneumonia in hospital wards, where it often rages epidemically.

Whooping-cough prepares the organism for infection from the streptococcus. The secondary infection, according to Mosny, may be explained in several ways:

by chemical action, the primary infection modifying the normal acid reaction of the lung; by physiological action, the primary infection impeding the phagocytic function of the cells of pulmonary epithelium and of the leucocytes; by mechanical action in modifying the broncho-pulmonary epithelium and promoting the invasion of the organism by the streptococcus.

Such invasion of the lungs is the principal cause of the broncho-pneumonias of whooping-cough. In rare cases other micro-organisms intervene, which seem to play a rôle in the development of this complication, or at least of some of its varieties. In three cases of broncho-pneumonia, developed during whooping-cough, and followed by cure, Haushalter established, during the evolution of the pulmonary complication, the presence of the *gilded* streptococcus in the patient's blood. This microbe has yielded virulent cultures which, injected into the circulation of rabbits, have determined fatal broncho-pneumonia.

The broncho-pneumonia of whooping cough may produce a series of secondary complications which are rather conditioned by the pulmonary complication than by the primary infectious malady. They have no features peculiar to whooping-cough. In this connection we have before mentioned the chronic dilatation of the bronchi, which is an ordinary consequence of chronic broncho-pneumonia.

Acute dilatation of the bronchi is quite frequent in whooping-cough. It is conditioned by the concomi-

tant bronchitis, and is not of great importance from a prognostic point of view. It is not characterized by special stethoscopic signs, and is often one of the revelations of an autopsy. Acute bronchial dilatation is commonly generalized.

Emphysema is frequent in whooping-cough. Its presence is readily explained in this malady where the shock of the cough exhibits a violence rarely existing in the other affections of the respiratory passages. Two forms are observed: alveolar and interlobular emphysema.

Alveolar emphysema exists in acute form in most whooping-cough patients, and is almost uniformly revealed by autopsy. According to H. Roger, it disappears after cure of the infectious malady. Trousseau claims that it may persist and finally assume the form of constitutional emphysema.

Interlobular emphysema is much more serious. It may be limited to the lungs or may become general—may gain the cellular tissue of the mediastinum, and manifest itself in the cervical region by the presence of gaseous, sonorous tumors whose contents may be emptied by gentle pressure, causing access of air into the cellular tissue. This emphysema is observed only in grave whooping-cough. Vorthrup has seen it accompany pulmonary abscess in an infant two months old.

With this purely mechanical lesion we may associate pneumothorax, observed by H. Roger; the

mode of its development was almost latent. The effusion of air into the pleura was slowly absorbed without causing liquid effusion. The patient was cured.

Hernia of the lung was reported by Adler in an infant, occurring at the level of the nipple-line and at the height of the sixth rib, where it appeared like a tumor of the size of a plum. This tumor evidently consisted of a pneumocele; fluctuated; was sonorous; and varied in volume during the respiratory movements. It was susceptible of complete reduction and gave rise to a crepitant murmur. Auscultation of the tumor revealed the vesicular sound.

Pleurisy is very rare in whooping-cough, and when it does occur it is most commonly the cause of a broncho-pneumonia. It has been observed, though rarely, during convalescence from whooping-cough, independently of any pre-existing pulmonary complication.

Pleurisy, as observed in whooping-cough, is serous or sero-purulent.

Pericarditis has been reported by Racchi, who observed one case of sero-fibrinous pericarditis in the course of a whooping-cough complicated with broncho-pneumonia. The sero-fibrinous liquid contained in the pericardial cavity was injected into three rabbits and determined a convulsive cough in these animals, and they infected others in neighboring cages. Autopsy performed on several showed pericarditis.

LARYNGEAL COMPLICATIONS.

Catarrhal laryngitis is frequent in whooping-cough, often accompanying the bronchitis. Rare at the *début*, it is mostly observed during the period of maturity. It is seldom intense, and commonly produces only a transient hoarseness. Several authors, struck with the frequency of the congestive and catarrhal alterations of the subglottic region, of the vestibule and of the vocal cords, observed on autopsy, have ascribed an important rôle to the laryngitis in the production of the paroxysms. This rôle is, however, dubious, for the alterations in the larynx, though frequent, are not constant. In several rare cases, reported and studied by R. Blache, the laryngitis of whooping-cough was accompanied with serous infiltration of the cellular tissue of the subglottic region, and gave rise to grave accidents of glottic œdema.

Laryngeal vertigo has been twice observed by Thermes in aged sufferers from whooping-cough.

Of all laryngeal complications which may be observed in the course of whooping-cough, the most serious is glottic spasm. This formidable accident has been studied by Du Castel, who has published seven observations concerning it. Its essential feature is the absence of the sudden and sibilant inspiration. The spasms of cough occur as in the paroxysms of ordinary whooping-cough; but the inspiration which commonly prevents asphyxia is absent in these suffer-

ers, and suspension of inspiration is the cause of asphyxia.

The accesses of suffocation due to spasm of the glottis, commonly supervene in the paroxysms of cough, but they may ensue independently of any convulsive cough (Du Castel).

Glottic spasm may produce rapid and almost sudden death, and to this accident are due almost all the cases of sudden death observed in whooping-cough.

In a certain number of cases the accidents are less grave, then constituting an attenuated form of glottic spasm. In this form, after a momentary arrest, respiration is resumed, and the return to life is announced by several deep and convulsive sibilant inspirations.

Autopsy performed on children who have succumbed to spasm of the glottis reveals the existence of a very pronounced emphysema, at once vesicular and interlobular, and a state of the lungs corresponding to the asphyxia. The pleural ecchymoses described by Tardieu are frequent.

The sudden death which has been at times attributed to excessive bronchial secretion, and at times to pulmonary embolism, is due in the immense majority of cases to the accidents produced by glottic spasm. There is spasm of the constrictor muscles of the glottis, with persistent contraction of the expiratory muscles.

NERVOUS COMPLICATIONS.

The most frequent, and at the same time the most serious, of the nervous complications of whooping-cough, are presented in the form of accesses of eclampsia. The frequency of the latter in the acute diseases of childhood is well known. This nervous complication is, then, readily explained in whooping-cough, where the spasmodic element plays a rôle of the utmost importance.

Glottic spasm, due to an internal convulsion of the inspiratory muscles and of the constrictor muscles of the glottis, is a variety of internal eclampsia. True eclampsia manifests itself by external convulsions. It attacks particularly very young children—those who have not yet passed their third year—and is observed almost exclusively in grave cases of whooping-cough. This complication is quite rare. In 431 cases of whooping-cough, H. Roger observed it only fifteen times.

Eclampsia occurs under two conditions. Most commonly it supervenes when whooping-cough is complicated with a broncho-pneumonia. It then marks the *début* of the latter. More rarely, it supervenes in the absence of any thoracic complication.

According to Rilliet and Barthez, the convulsions are preceded by several premonitory phenomena, consisting of nervous agitation and drowsiness. They are sometimes announced by cephalalgia (Abercrombie), or may make their *début* suddenly.

The convulsions ordinarily make their appearance during a violent paroxysm. Sometimes, but rarely, they begin in an interval between paroxysms. The sudden *début* without precursory signs takes place only when the convulsions are related to a pulmonary complication.

The convulsions are partial or general. When partial they consist in tonic and clonic convulsions of the muscles of the face or of the members. When general they extend to all the muscles of the body. During the crisis intelligence is momentarily suspended; insensibility is complete. In ordinary cases, the convulsions, at first tonic, become clonic in a second phase. The first crisis may be terminated by death, most frequently caused by glottic spasm (internal convulsion) accompanying the external convulsions. When, as is the rule, the first accesses do not prove fatal, the convulsions are followed by a phase of coma. Presently new convulsions take place, alternating with the coma. This state of excitation and nervous depression generally ends in death in a short space of time (one, two or three days). Children generally succumb during the twenty-four hours following the appearance of the first crisis (Rilliet and Barthez).

The immediate effect of the convulsions is to produce certain modifications of the cough. The paroxysms are not suppressed, but become less frequent. The expiratory spasms are less loud and

numerous. The whistling inspiration ceases to occur.

The convulsions are of extreme gravity in whooping-cough. When they accompany a pulmonary complication such as broncho-pneumonia, they inevitably end in early death. Supervening independently of any complication, the prognosis still remains of the utmost gravity. Six times out of seven they cause death (Rilliet and Barthez). When they do not kill through spasm of the glottis, they kill by the cerebral hyperæmia, evident signs of which are revealed by autopsy.

Eclampsia is due to congestive lesions of the brain, which leave behind traces appreciable with difficulty on anatomical examination. It is not conditioned by organic lesions such as hæmorrhage or softening. When whooping-cough determines organic lesions of the cerebrum, they manifest themselves by the ordinary symptoms of lesions with foci, particularly by hemiplegia (cases of West and Radcliffe Croker; cases of right hemiplegia with paralysis of the left oculo-motor and transient hemianopsia, observed by Silex).

With respect to the peripheral nervous system, Moussous and Moebius have reported acute paralyses during convalescence from whooping-cough. These acute paralyses are conditioned by a generalized acute polyneuritis.

Moebius' case was that of a child three years old in whom the paralysis made its *début* six weeks after

the beginning of the whooping-cough. The paralysis was characterized by difficulty in walking and in maintaining a sitting posture. As in paralyses due to peripheral neuritis, the rotular reflexes were abolished. The paralysis extends to the muscles of the upper members and those of the neck. The sphincters remain normal. There is no muscular atrophy. Improvement was rapid; three weeks after the *début* of the accidents every trace of paralysis had disappeared, but the tendinous reflexes still remained absent—these reappeared after the lapse of another month.

Organs of Sense.—Amaurosis has been likewise observed by Alexander, as a consequence of whooping-cough. In his first case—that of a child three years old, terminating fatally—complete blindness supervened without external lesion of the eye. On examination with the ophthalmoscope a slight dilatation of the central vein of the retina was observed. Shortly after the inception of blindness, cerebral symptoms, with convulsions of the right members, developed, and carried off the child at the end of fifteen days.

In a second case, after several precursory symptoms, consisting of chronic headache and dimness of vision, a girl twelve years old, suffering from whooping-cough, became completely blind. In this case the pupils were dilated, immobile, and no longer reacted under the influence of light. Alexander determined

the existence of a double optical neuritis with slight swelling of the two papillæ, whose contours had lost their distinctness. After several days, vision and optical neuritis progressively improved, and the pupils again reacted to light. Nevertheless, in publishing his observations, Alexander did not venture to assert definitive cure.

Alexander explains the supervention of blindness in the first case by a localized cerebral œdema between the quadrigeminal tubercles and the occipital region; in the second case he attributes it to a descending optical neuritis following a meningitis of the base, which is stated to have been cured.

Acute and transitory blindness has been reported by Jacoby.

Whooping-cough may produce deafness by a double mechanism (Falls). Sometimes the deafness supervenes after recovery from the whooping-cough. It is unilateral or double. The external and the middle ear enjoy an indemnity from any appreciable alteration. The deafness is then the consequence of an affection of the labyrinth (Falls). In another series of cases suppurating otitis media prevails, which may finally become complicated with lesions of the internal ear.

In terminating this review of the nervous complications of whooping-cough, we should not overlook its influence on the subsequent development of a certain number of nervous diseases supervening long after recovery from the original malady.

The labors of Pierre Marie on the pathogeny of several affections of the nervous system have revealed the rôle played by prior infection in the development of these diseases. He maintains that insular sclerosis, epilepsy, and cerebral sclerosis are often the consequence of the infectious maladies of infancy.

Whooping-cough is often revealed in the antecedents of the patient suffering from these nervous affections. There is accordingly good ground for taking into account its pathogenic influence on their development.

COMPLICATIONS OF THE MOUTH.

Ulceration of the frenum of the tongue may be the occasion of severe complications during the secondary infections. In permanent contact with numerous microbes of the mouth this ulceration may be infected by them, and such is the pathogeny of ulcerous stomatitis, simple or accompanied with alveolar osteitis. At times the ulceration serves as a portal for the admission of saprophytes, producing gangrene of the mouth, which has been repeatedly observed during the course of, or convalescence from, whooping-cough. Most commonly these diverse buccal complications are conditioned by the existence of an ulceration of the frenum of the tongue, but this ulceration is not indispensable. An aphthous stomatitis may develop during whooping-cough when there is no ulceration of the frenum, and may cause ulcerous stomatitis or gangrene of the mouth.

The habitual facial congestion and the mechanical embarrassment of the venous circulation greatly promote the production of these complications.

SECONDARY INFECTIONS.

Among the complications of whooping-cough which we have now studied, many are due to secondary infections. To cite only the most frequent and serious, broncho-pneumonia seems to be manifestly conditioned by a superadded infection.

The secondary infections which remain to be treated are purely accidental and are not peculiar to whooping-cough. The most important is tuberculosis in any one of its forms.

Uniformly tuberculosis has been reported as prevailing during or after the whooping-cough, and has been considered as one of its frequent complications; but the pathogenic rôle of whooping-cough long remained uncertain and variously interpreted. It is now admitted that tuberculosis is always the result of a secondary infection—the consequence of a subsequent contagion. In the children's hospitals where the whooping-cough patients are surrounded by tuberculous subjects, the possibility and the reality of contagion are readily comprehended. The conditions of contagion are not lacking; its possibility is obvious. Hospital patients live in an environment of tubercular bacilli. They are debilitated by the whooping-cough and exhausted by the vomiting which impedes normal nutrition. The respiratory organs are irritated, if not inflamed. They present to the tubercular bacillus a soil all prepared for its germination.

Tuberculosis may develop during the course of a whooping-cough in process of evolution; but most commonly its first signs are observed during convalescence.

The state of things generally perceived is as follows: The whooping-cough is declining when the child begins to manifest the first signs of tuberculosis; in most cases this is of the chronic pulmonary type, of which a fever, aggravated in the afternoon, is the first sign. If no bronchitis prevailed before, the cough which then ensues presents characteristics different from those of whooping-cough paroxysms. This cough is dry and not followed by expectoration; it is the characteristic cough of bronchitis. The paroxysms of whooping-cough do not cease completely, but they become less violent, and notably less frequent; the tubercular process, in course of evolution, attenuates their intensity and masks their characteristics, producing upon them the same effects as does broncho-pneumonia. The persistent paroxysms seem to be smothered or suppressed; the sibilant respiration ceases to be heard.

Subsequently the paroxysms disappear, the symptoms of pulmonary tuberculosis at the same time becoming more persistent and accentuated. The child recovers from the whooping-cough while the tuberculosis continues its generally rapid evolution.

Pulmonary tuberculosis with successive foci is not the only form observed. Frequently the tuber-

culosis is manifested in the form of tuberculous broncho-pneumonia. One or several lobes of the lung are invaded at the outset. Fever is then intense and continued. The cough is incessant; asphyxia progresses rapidly. In such instances the tuberculosis develops in the manner of a subacute broncho-pneumonia. On autopsy, several pulmonary lobes are found infiltrated with cheesy masses—not soft, but with the familiar aspect of Roquefort cheese. With these tuberculous masses so common in infancy, and which ally this form of pulmonary tuberculosis with experimental tuberculosis, disseminated tubercles almost always exist in most of the organs, and particularly in the liver.

Whooping-cough is also followed by tuberculosis of the miliary type, with the deposit of tubercles in most of the organs. This form of tuberculosis presents rather the clinical tableau of typhoid fever than that of an affection of the respiratory passages.

Meningeal tuberculosis has been reported by various authors as one of the possible forms of tuberculosis consecutive upon whooping-cough.

The bronchial ganglia, which quite commonly undergo modification in whooping-cough, are frequently the first organs in which the deposition of tubercles is made. In such case the initial phenomena are those of tuberculosis of the tracheo-bronchial ganglia. Limited to these ganglia at the outset, tuberculosis soon invades the lungs or other viscera

and produces death through tuberculous generalization.

Thus far we have regarded tuberculosis as a complication of whooping-cough; the converse may be encountered. Tuberculous patients are occasionally attacked by whooping-cough during the course of phthisis. In such instances, what is the influence of the whooping-cough on the tuberculosis in course of evolution? The tuberculosis does not prevent the production of the paroxysms, but, by attenuating their symptoms, it renders them less characteristic. The two maladies progress, each presenting its own distinctive signs. In these conditions the effect of the whooping-cough is frequently to accelerate the evolution of the tuberculosis.

Other infectious maladies may also complicate whooping-cough, and are due, as is tuberculosis, to a superadded contagion. The morbid association of whooping-cough with the infectious diseases of infancy has been particularly observed in the hospitals, and may be readily explained by the promiscuous conditions which long prevailed in the wards of children's hospitals, where were gathered together pell-mell patients suffering from diverse infectious diseases. In those days it was no unusual thing for patients suffering from whooping-cough, measles, scarlatina, and even diphtheria, to be attended by the same *personnel* and in the same ward.

In reality there is nothing mysterious in the as-

sociation of whooping-cough with other contagious maladies. There is no need of assuming a special affinity of the virus of whooping-cough with that of other infectious maladies. The contagion is a sufficient explanation of these morbid associations. If whooping-cough is quite often complicated at the hospital with another infectious malady, the cause is some disease of long duration necessitating a sojourn of several weeks in an infected environment. Whooping-cough, not confining children to their beds, permits more frequent and more intimate contact with the other patients (H. Roger). The duration of the sojourn at the hospital, and the possibility of contact, sufficiently explain the frequency of secondary contagions.

The most frequent infectious complication of whooping-cough in children's hospitals is measles. Out of 431 cases observed at l'Hôpital des Enfants, H. Roger observed seventy-eight which were complicated with measles.

The morbid association of whooping-cough and measles has long been the subject of reports during epidemics of the first-mentioned. Some authors have been so struck with this phenomenon that they have inferred an intimate relationship between the two maladies. Franck maintained their identity and their common origin. In 1854 Germain Sée set forth the analogies between measles and whooping-cough with respect to their evolution and their special com-

plications, as also their frequent coexistence, and deduced their common origin.

The doctrine of the identity of whooping-cough and measles is sufficiently controverted by clinical observation, and has been definitively refuted by Rilliet and Barthez and by H. Roger.

Measles may precede whooping-cough or may follow it. Most commonly it precedes, but this is due simply to the fact that measles, more frequent than whooping-cough, more rapid in its course, and more serious in its symptoms, contributes a greater number of patients to the hospital.

When whooping-cough is complicated with measles, the ordinary symptoms persist, with the usual attenuation which accompanies any intercurrent febrile state. The paroxysms are quite as numerous, but duller and less violent; during their intervals the children exhibit the loose cough common in measles, which is always accompanied with bronchitis.

Whooping-cough exerts no action on the eruptive phenomena of the malady. The eruption proceeds as usual and may be extremely intense.

The morbid association of whooping-cough with measles is really peculiar in its broncho-pneumonic complications, which are, we may say, the rule, and which impart to this association an extreme gravity. In two cases out of three, whooping-cough associated with measles is complicated with broncho-pneumonia

or capillary bronchitis. The complications may occur at any period in the malady, but most often develop early. In the Geneva epidemic of 1847, Rilliet and Barthez observed the invasion of capillary bronchitis and of broncho-pneumonia on the very day of the *début* of the paroxysmic period—at a time, consequently, when these complications are exceptional in simple whooping-cough. It seems that these two diseases, whose principal action is brought to bear on the respiratory apparatus, combine their effects and facilitate thus the invasion of the lungs and of the bronchi by the pathogenic micro-organisms of broncho-pneumonia.

Whooping-cough may be associated with diphtheria under the same conditions as measles, that is, as the result of a superadded contagion. H. Roger observed this morbid association twenty-four times at the Children's Hospital. In fourteen cases the diphtheria was of the croupal type, and terminated nine times in death; of the five other cases, which were cured, in three tracheotomy was performed. H. Roger thinks that in such cases the influence of the whooping-cough is rather favorable. The paroxysms and the vomiting facilitate the mechanical detachment of the false membranes, and serve the purpose of emetics which formerly enjoyed such a vogue in the treatment of laryngeal diphtheria.

Sanné, who in four cases observed the complication of whooping-cough with diphtheria, saw his pa-

tients die of broncho-pneumonia. He accordingly concluded that whooping-cough, when complicating diphtheria, exerts a pernicious influence on the latter.

When whooping-cough is complicated by diphtheria the paroxysms persist, but the characteristic sibilance is not produced. The paroxysms do not increase the number of the dyspnœic accesses of croup (Sanné).

Scarlatina may also complicate whooping-cough, and this complication was observed by Sanné in eleven cases. According to H. Roger a benign scarlatina has no influence on the symptoms and evolution of whooping-cough.

According to the observations of Sanné, scarlatina may be modified at times by the absence of one of the principal symptoms (the angina was absent in one case), at other times by the addition of abnormal and serious phenomena such as cerebral disturbances. Five out of the eleven patients of Sanné succumbed. The invasion of scarlatina modified the paroxysms of cough, diminishing their number and intensity. The paroxysms returned after the disappearance of the scarlatinous exanthema. The amelioration sometimes persists (Sanné).

Smallpox may occasionally complicate whooping-cough (H. Roger). If not serious, and if the case be one of varioloid, it neither mitigates nor aggravates the whooping-cough.

FORMS OF WHOOPING-COUGH.

The disease which I have thus far described is whooping-cough of average intensity as it is most frequently observed in children of from three to seven or eight years of age. Whooping-cough, even the non-complicated, is not always thus presented to clinical observation, being subject to variations which depend upon the intensity of the malady and the age of the patients; and there is good ground for studying these variations in accordance with the two factors—intensity, and age of the subject. The differences are at times sufficiently pronounced to constitute special forms of whooping-cough.

With respect to the intensity of the disease, the different cases may be divided into three classes. According to the division of H. Roger, whooping-cough may occur in three forms:

1. Mild whooping-cough.
2. Whooping-cough of mean or average intensity.
3. Intense whooping-cough.

These three forms are differentiated solely by the number and intensity of the paroxysms, and all three proceed from the same pathogenic virus and may mutually engender one another.

The mildest whooping-cough may by contagion give rise to the most dangerous form, just as intense whooping-cough may determine a very benignant attack. The virus is identical. The degrees depend

upon the conditions of receptivity which permit exaltation or attenuation of the morbid virus.

Whooping-cough of mean or average intensity is the most frequently observed in the clinic, and this I have selected as the type of my description.

Imagine this same whooping-cough with a greater or lesser number of paroxysms and with secondary symptoms correlated to the attenuated or reinforced paroxysm, and you will have the tableau of the other morbid forms of the disease.

Mild whooping-cough is quite rare. In this type the paroxysms are few in number; from twenty to thirty (the ordinary number during the twenty-four hours in whooping-cough of mean intensity), the paroxysms fall to five or six, sometimes more, sometimes less. In certain cases only two or three (and these not severe) occur during the twenty-four hours. Some are only intimated, as it were, being composed only of expiratory spasms without sibilant inspiration. Expectoration is scanty, sometimes *nil*. Vomiting is exceptional; during the intervals the health is good. Bronchitis is absent, and auscultation of the chest reveals no signs of bronchial catarrh; temperature is normal. In this form the complications are exceptional.

The mild form of whooping-cough performs its evolution in a relatively short time, and is always followed by recovery. Each of the periods is abbreviated, the spasmodic period particularly.

In this form whooping-cough is a benignant malady, producing no disturbance of the general health, hence requiring no active medical intervention. Most commonly the children do not keep their room, but continue to go out and to participate in their ordinary pleasures. The very benignity of the disease, necessitating no assiduous surveillance, often results in facilitating its dissemination in the circle of the patient's acquaintance, and with respect to the diffusion of whooping-cough this form is the most dangerous.

Grave or intense whooping-cough is the form of the disease in which the paroxysms attain their maximum frequency and intensity. In this form a considerable number of paroxysms is noted—twenty-four and more during the twenty-four hours. The paroxysms are not only numerous, but prolonged and intense. As each supervenes, the physician seems to behold a veritable access of suffocation. During these paroxysms the face is purple; the injected eyes protrude from their orbits; the extremities are cold. Blood frequently issues from the nostrils and ears, or appears in the form of ecchymoses in the subconjunctival cellular tissue.

The vomitings are constant, and are renewed at each access.

The paroxysms follow in such close succession that hæmatosis, interrupted for the time being cannot proceed to a completion during their inter-

vals. Thus, respiration becomes permanently impeded. In certain patients the asphyxia progresses uninterruptedly and ends by causing death, in the absence of any complication.

Intense whooping-cough is always accompanied with grave general phenomena. The temperature is constantly elevated; the pulse is excessively rapid; dyspnœa is extreme. Auscultation reveals the existence of a generalized bronchitis extending to the lesser bronchial ramifications.

This grave form of whooping-cough commonly ends in death. The fatal termination may be due to progressive asphyxia; sometimes it is the consequence of inanition caused by the incessant vomiting, which is renewed at every attempted feeding; or, finally, it may be due to complications—this form being especially subject to broncho-pneumonia or to the convulsions whose prognosis is almost uniformly fatal.

Despite these numerous causes of death, grave whooping-cough may yet result in recovery if the child be particularly robust. When terminating favorably, this form of whooping-cough is always of long duration and subject to numerous relapses during convalescence. It is often attended with a sequel in the form of lesions of emphysema or of bronchial dilatation. It is particularly true of this form of the disease that long after recovery the children retain a predisposition to paroxysmic cough, which reappears on the occasion of an accidental bronchitis or of any malady of the respiratory passages.

The Influence of Age on the Whooping-Cough.—Generally speaking, the gravity of whooping-cough is in inverse ratio to the age of the patient; the younger the subject, the more serious the disease. In this respect whooping-cough in children at the breast is the most dangerous of all, as much by reason of the intensity which it commonly assumes during the first months of life as on account of the slight resisting power of its victims.

In new-born infants whooping-cough generally makes a rapid *début.* The first period is notably abridged; the paroxysms make their appearance speedily, and are violent and repeated from the outset. Fever is constant. The disease is almost uniformly complicated with broncho-pneumonia, and fatal in its termination.

The difficulty of alimentation aggravates the prognosis of whooping-cough in the new-born. Any attempt at nursing determines a paroxysm; hence the children instinctively refuse to take the breast. In most cases recourse must be had to forced alimentation, and this requires great caution, for the introduction of the sound, or frequently of an ordinary spoon, is enough to provoke a paroxysm.

During the first days of life the prognosis of whooping-cough is absolutely grave, and the infants stricken at the moment of birth almost inevitably succumb.

The whooping-cough of adults is generally be-

nignant, and, according to H. Roger, it is to this form that the description of mild whooping-cough applies. It differs from the disease as exhibited in children by the modifications which the paroxysms undergo, and which are conditioned by the different structure of the larynx. The relative width of the glottic orifice renders the contraction of the glottis incomplete. Hence the paroxysms are composed solely of expiratory spasms, generally separated by an interval and broken by periods of repose. The sibilant inspiration, which is due in infants to the passage of air through the constricted glottic cleft, is not observed. The expectorated matters are slowly expelled; they are not vomited as in infancy. The cough in adults recalls that of tuberculous subjects whose tracheo-bronchial ganglia are hypertrophied.

Adult whooping-cough is not attended with general phenomena, and it is rarely of such gravity as to require confinement to the room. It is almost uniformly accompanied with bronchitis. Hence, in connection with the paroxysms, which are few in number and are modified in their clinical expression, a cough almost always prevails, which is bronchial in character. Complications are altogether exceptional.

Despite its benignity, adult whooping-cough generally persists for a long time; its duration is rarely less than a couple of months.

PROGNOSIS OF WHOOPING-COUGH.

The gravity of whooping-cough is in direct ratio to the number of paroxysms. When the latter are few in number—not more than ten or twelve during the twenty-four hours—recovery is almost certain, and death exceptional. When they are very numerous, and exceed seventy or eighty during the twenty-four hours, the whooping-cough is extremely grave and commonly results in death. Trousseau declared death to be certain when the paroxysms reached the number of sixty. This prognosis is too rigorous, for H. Roger has cited examples of cure under such circumstances. And yet, when the paroxysms are so frequent, the disease is of the utmost gravity, and results fatally in the great majority of cases.

With respect to the division of the disease into mild and grave cases, it may be stated that one-quarter of the total number are intense, with more than forty to fifty paroxysms during the twenty-four hours. Another quarter is composed of mild cases with the paroxysms numbering less than fifteen during the twenty-four hours. A half of all cases are of mean intensity, the number of paroxysms varying between fifteen and thirty. Whooping-cough of mean intensity is accordingly the most frequent, and is usually followed by recovery; when terminating fatally, death is the sequel of a complication.

Age is a factor of the utmost importance from a

prognostic point of view. In early infancy, under one year of age, whooping-cough is extremely grave, for the reasons which we have already indicated. At this term of life the disease is almost always intense, and its gravity is aggravated by the feebleness of the patients and the difficulty of alimentation.

During the second year whooping-cough is not infrequently fatal. After the third year, the dominating type is milder up to the eighth or ninth year; later on, it becomes benign and is almost always cured.

Environment plays a very important rôle in making prognosis. In the hospital, whooping-cough is much more dangerous than in city practice—in consequence of assembling all the causes of secondary infection, which are so important in the genesis of the complications. In the city the child escapes the secondary infections, and has far more chance of recovery.

Whooping-cough seems to partake of a graver character in certain countries (particularly in northern lands) than in temperate regions; in warm climates its gravity seems to be least. In Greenland, whooping-cough is stated to be one of the principal causes of death (H. Roger).

We have seen that a quarter of all cases of whooping-cough are serious and terminate almost uniformly in death. Furthermore, cases of mean intensity may result fatally in consequence of a com-

plication. We may accordingly conclude that 35 to 40 per cent. of the cases observed in hospital have a fatal termination; and this proportion is in accord with that of H. Roger, who found death to ensue in the ratio of 142 out of 423 cases observed in his department of the Hospital for Sick Children.

The figures cited by this author are interesting, for they show clearly the influence of age on the prognosis.

Out of 424 cases H. Roger observed:

	No. of Cases.	No. of Deaths.
Between birth and 2 years of age....	16	11
Between 2 and 3 years.....	106	64
Up to 3 years of age.....	85	31
Up to 4 years.....	77	35
Up to 5 years.....	63	15
Between 6 and 14 years.....	77	19
From 9 to 13 years.....	..	0

What is the cause of death in whooping-cough?

In rare instances death may be sudden. As Du Castel has shown, it is then due to spasm of the glottis, by convulsion of constrictor muscles of this orifice. This rule is not absolute, however, as sudden death is sometimes attributable to other causes—according to some authorities, to functional disturbance of the pneumogastric.

Sometimes death is caused by progressive asphyxia, and this is observed when the numerous and close-following paroxysms produce permanent em-

barrassment of respiration and render impossible the fulfillment of hæmatosis amid normal conditions.

In exceptional cases the digestive troubles and the incessant vomiting, repeated at every attempt to administer food, produce death through progressive inanition.

Most commonly the fatal termination is due to some complication, and at the head of the mortal complications stands broncho-pneumonia in its various forms.

Broncho-pneumonia is almost always fatal, and progresses rapidly. Frequently enough it becomes chronic, with a prognosis less immediate but equally formidable.

Eclampsia, which is quitè rare, is almost absolutely fatal and causes death after a slight delay.

With eclampsia due to encephalic congestion we must associate meningeal or cerebral hæmorrhage, to which death is occasionally due.

The other causes of death involve superadded maladies which are developed by contagion during the whooping-cough. Such is tuberculosis in any of its forms, as it is too frequently observed among children treated in hospitals. This complication rages with special severity amongst weakly, lymphatic or scrofulous infants, predisposed by heredity or by organic debility.

The prognosis of whooping-cough must be considered not alone with respect to the immediate evolu-

tion of the malady, but also with due reference to the future. Whooping-cough may, indeed, determine lesions which evolve slowly and become manifest only after a long interval.

One of the possible results of whooping-cough is vesicular emphysema, which exists throughout the duration of the malady. It may be, and commonly is, cured. But in some cases it persists, is aggravated from year to year, and finally merges into constitutional emphysema with all its consequences: accesses of asthma, cough, and permanent dyspnœa, terminating in asystolia. A certain number of emphysemas in adult age, attributed to arthritism, are probably due to no other cause than a whooping-cough during infancy, which, though cured long ago, left in its wake a pulmonary lesion which has since been aggravated from year to year.

Chronic dilatation of the bronchi may also have its origin in an ancient whooping-cough.

DIAGNOSIS OF WHOOPING-COUGH.

The crisis of convulsive cough, constituting the paroxysm, is of so distinctive a character that the observation of one paroxysm of whooping-cough is commonly sufficient to reveal its nature. Doubt is possible only under exceptional circumstances, and the diagnosis of the disease is accordingly limited in most cases to a recognition of the paroxysms.

The difficulty of diagnosis varies considerably, according to the diverse periods of the malady.

During the first period diagnosis is almost impossible, the paroxysm which forms the pathognomonic symptom having not yet appeared. The disease may be suspected, but cannot be affirmed.

At this period the child presents the ordinary signs of a bronchial catarrh of average intensity. The general symptoms are in no wise peculiar, although it has been erroneously affirmed that in the initial catarrh of whooping-cough the fever is more intense and, especially, more persistent than in simple catarrh *à frigore*, and that the dyspnœa is also more marked. As a rule, the general symptoms during the first period of whooping-cough are identical with those observed in simple bronchitis—sometimes, indeed, they are even less grave—and it is rarely possible to establish a precise diagnosis for several days.

And yet, even in the absence of positive signs, an etiological reason will sometimes permit diagnosis of

whooping-cough at its *début;* and that is, positive information of a prior contagion. The malady may be predicted with certain assurance when cough supervenes in a child living in an environment where whooping-cough prevails, provided, of course, the child has not himself undergone a previous attack.

At the close of the first period, the cough, without being yet pathognomonic, assumes certain peculiarities which may put us on our guard. First, it becomes more frequent in the evening and during the night. In certain cases and at certain moments the cough becomes very painful and exhausting, comprising a series of expiratory spasms, like the cough which accompanies the expulsion of foreign bodies from the respiratory passages.

In some cases—and this is a more important fact —the convulsive cough is accompanied from time to time with the suggestion of a sibilant inspiration. Thus constituted, this cough precedes for a short time the true paroxysmic cough, and announces the *début* of the second period.

During the second period, if the physician happens to observe a paroxysm and hears the noise of the expiratory spasm and the sibilant inspiration—if he observes expectoration to follow and terminate the crisis,—the diagnosis becomes peremptory, for no other malady could determine a paroxysm thus characterized.

In truth, the paroxysms of cough sometimes ob-

served in simple bronchitis are never so long or so intense. They are not accompanied with sibilant inspiration and are not followed by expectoration, at least in children.

The expectoration which follows the paroxysm is of the greatest importance in diagnosis. Whooping-cough is, indeed, almost the only malady of infancy which gives rise to expectoration.

The latter is at times very abundant and may cause confusion by suggesting a pulmonary cavity (vomica), due to a purulent pleurisy or to a pulmonary abscess discharging into the bronchi. This error will be avoided if we remember that the expectoration due to a vomica is composed of greenish and liquid pus, whereas the expectoration of whooping-cough is composed of stringy matter difficult to detach and resembling a gummy emulsion. Moreover, pleural or pulmonary cavities supervene after a malady whose evolution is altogether different, and are accompanied with stethoscopic signs which are not found in whooping-cough.

Vomicæ determined by chronic dilatation of the bronchi may also give rise to paroxysms; the origin of the latter may be diagnosed by the characteristics of the expectorated matter, as also by the stethoscopic signs and the evolution of the malady.

The paroxysms due to cavities or vomicæ are never so frequent as are the paroxysms of whooping-cough. Rarely do more than three or four occur during the twenty-four hours.

The paroxysms due to tracheo-bronchial adenopathy are more difficult to recognize. We know that these paroxysms are particularly observed in the tuberculous, whose tracheo-bronchial ganglia, having become caseous, are hypertrophied.

All the tumors of the mediastinum may determine paroxysms of cough by a mechanism analogous to that of tracheo-bronchial adenopathy, that is, by compression and irritation of the pneumogastric nerves.

In infancy, tuberculization of the mediastinal ganglia is not rare. Inasmuch as the disease is of slow evolution with evening fever, and as the paroxysms which it determines are often followed by vomiting, the clinical tableau may be very analogous to that of whooping-cough.

Tuberculosis of the tracheo-bronchial ganglia is recognized in that the cough is not manifested solely by paroxysms. In the intervals a dry cough is heard, which does not exist in uncomplicated whooping-cough. Expectoration is *nil*, or if it exists at moments (which is exceptional), it has not the same characteristics as in whooping-cough. If there be expectoration, the bacillus of tuberculosis may be discovered in the expectorated matter. Finally, pulmonary tuberculosis frequently accompanies tuberculosis of the mediastinal ganglia, and gives rise to stethoscopic signs which are readily recognized.

Moreover, the general condition differs consider-

ably in ganglionic tuberculosis. Diarrhœa is frequent; the visage is emaciated, and the appearance is very different from the puffiness observed in whooping-cough. Fever is constant.

In *résumé:* The observation of the paroxysm enables us in the majority of cases to fix its origin. The paroxysms are frequently separated by intervals, and the physician may not witness one during his first visits; hence, in doubtful cases he may endeavor to provoke them by certain means. The child may be made to run, or he may be made to open his mouth, the throat being tickled with the finger or with a feather. A simple means which often succeeds consists in undressing the child and exposing its chest naked to the air of the room. Sometimes, simply stroking or tickling the skin is sufficient to produce a paroxysm. In many instances it is only necessary to administer a mouthful of cold liquid. Rarely do these measures fail; and yet, if the case be mild, they may not provoke a paroxysm. The physician is then obliged to rely on the statements of the parents or attendants. Frequently the description given by parents of experience is sufficiently exact to render possible a precise diagnosis. If the parents state spontaneously that the child expectorates after the paroxysms, this information is of great value. The same applies to epistaxis during or after the paroxysm. Nevertheless it is well to accept with certain reservations the descriptions given by those

attending the patient, and such statements must be controlled by an examination of the signs which reveal whooping-cough.

Among the betraying symptoms the most important are: puffiness of the face, habitual congestion of the veins of the neck and visage, ulceration of the frenum of the tongue in children with teeth. A possible contagion or the modifications of an ordinary cough into paroxysmic cough may put us on the road to a diagnosis. Despite all, a solution of the problem is often impossible during the first days of the second period. Later on it would be very singular if the physician had no opportunity to witness a paroxysm which would put an end to all doubt.

It sometimes happens in an environment where whooping-cough prevails that children enjoying an indemnity from the disease begin to cough in paroxysms after hearing whooping-cough patients cough in this manner. H. Roger states that he observed cases of this kind, in which, however, it was easy to discover the simulation. But such imitative paroxysms no doubt exist, and may be explained without supposing a nervous contagion similar to that observed in the epidemics of tetanus which often attack an entire group of children. We know how susceptible children are to suggestion; frequently their instinct of imitation prompts them to mimic limping, *tics*, or convulsive movements. Paroxysms through imitation enter into this category; are produced by suggestion,

and may pass for paroxysms of whooping-cough. But the diagnosis of these imitative paroxysms is simple, since they develop amid special conditions. The expectoration is absent, and, moreover, on separating the children, the paroxysms rapidly disappear.

The diagnosis of whooping-cough being once established, it remains for the physician to determine its intensity and form, and to assure himself of the existence or absence of complications. The intensity of the whooping-cough may be measured by the number of paroxysms, which the parents should count and observe as they occur. The enumeration of the paroxysms is the only means of determining whether the disease grows worse, rests stationary, or improves. It will also enable the physician to gauge the effect of the treatment instituted.

We have sufficiently studied the complications, and need not return to the signs which characterize them and permit their diagnosis. We simply recall the fact that by following the course of the temperature, examining the thorax each day, and attentively observing the general state, we will be able to anticipate the *début* of most of the complications, and often also to prevent their development.

PATHOLOGICAL ANATOMY.

Whooping-cough does not determine characteristic organic lesions. Autopsy of the subjects who succumb during the course of this disease, reveals the existence of numerous lesions, but they are of diverse order and may almost always be referred to the complications.

Whooping-cough has no specific lesion comparable to the pustule of smallpox, to the false membrane of diphtheria, to the erysipelatous patches of erysipelas, etc., etc. Accordingly, pathological anatomy must confine itself to a statement of the principal lesions discovered on autopsy, of which the greater number possess a secondary importance. Several, however, are sufficiently frequent to merit consideration as playing a capital rôle.

At all times observers have striven to set forth the lesions which they considered characteristic of whooping-cough. According as they were impressed by the nervous element or by the respiratory element, they sought in the nervous system or in the respiratory apparatus the alterations which might be considered specific.

The nervous system has been incriminated by Desruelles, Copland, Kilian, Breschet, etc.

Desruelles attributed whooping-cough to a lesion of the encephalon, and regarded the malady as a broncho-cephalitis.

Copland placed its seat in the medulla oblongata, which he claimed to have found congested or inflamed.

Sanders, admitting the rôle played by the medulla, deemed it possible to localize with greater precision the initial lesion, and attributed it to hyperæmia of the pneumogastric nerves at their origin.

Kilian likewise maintained that the pneumogastric nerve is constantly modified in whooping-cough. He claimed to have found it congested in fifteen autopsies; asserting also that with hyperæmia of the nerve he found associated inflammation and thickening of the neurilemma. The lesions were not localized at the origin of the nerve; they were extended to the entire trunk, and were particularly visible in the thoracic portion.

According to these authors, the essential lesions of whooping-cough consist in alterations of the nervous system, central or peripheral, and the slightly marked lesions are of a congestive nature.

In reality, the lesions of the nervous system are but slightly characteristic, and may be totally absent in a large number of autopsies. Furthermore, when they exist they are faintly marked. Finally, they have not been verified by microscopic examination, which would alone permit our ascribing to them their real importance.

The alleged nervous hyperæmia, without microscopical examination of the nerve, has lost all import-

ance in the actual state of science. In fact, we are aware that the color-changes which characterize the nerve on autopsy are more commonly the phenomena of putrefaction than the results of lesions existing during life.

A large number of authors, attributing a predominant importance to the catarrhal element of whooping-cough, have placed the characteristic lesions in the respiratory passages. According to Marcus, Watt, Gendrin, Niemeyer, Beau, the lesions of the respiratory passages are constant. They are said to occupy by preference the upper respiratory passages, particularly the larynx. The larynx, the trachea, and the bronchi present a considerable hyperæmia, accompanied with catarrh more or less intense. The catarrhal lesions are further claimed to reside in very different places. According to Beau, they are seated almost exclusively at the level of the *supralaryngeal* mucous membrane. The theory of this author may be summarized as follows: The supralaryngeal mucous membrane, invaded by phlegmasia, secretes a more or less abundant mucus, the quantity of which is in proportion to the intensity of the disease. This mucus, descending the walls of the vestibule in small pieces, falls on the glottis. Reaching the mucous membrane which lines the lips of this orifice, it determines the reflex action and the spasmodic contraction which constitute the paroxysm.

Catarrh of the upper respiratory passages fre-

quently exists, and has been observed by Parrot and other observers during life, on making laryngoscopical examination. It may be urged that it is not constant; moreover, it cannot be considered as the characteristic lesion of whooping-cough, for it is in no wise special and may be observed in other forms of laryngo-pharyngitis which are not accompanied with paroxysms.

Indeed, hyperæmia of the mucous membrane of the larynx, of the trachea, and of the bronchi is a common lesion in whooping-cough, and may be found whenever a concomitant bronchitis prevails.

Generally speaking, hyperæmia is frequent in whooping-cough and may be noted in most of the organs—in the head, the kidneys, the liver, and on the mucous membranes of the digestive tube. It is ordinary, and is at times accompanied with swelling of Peyer's patches. This lesion is related to the infectious nature of the malady, and is also the consequence of the impeded venous circulation.

The hyperæmia may proceed to vascular rupture and the production of hæmorrhage. According to Copland, Peyer's patches, at first hyperæmic, may suppurate and ulcerate.

Hyperæmia is the dominant lesion of whooping-cough, as of all infectious maladies.

With general hyperæmia we must associate, by reason of their frequency, a certain number of secondary lesions determined by complications. The

respiratory apparatus is most frequently invaded; bronchitis, emphysema, dilatation of the bronchi, are usual. In the ordinary forms, bronchial dilatation is acute and disappears with the disease. Sometimes, however, it persists, if due to broncho-pneumonia of chronic form.

Broncho-pneumonia is frequently noted and is usually of the spleno-pneumonic type, although all the forms may be observed.

Broncho-pneumonia is sometimes accompanied with pleural inflammation with or without effusion. Hypertrophy of the tracheo-bronchial ganglia is frequent even in whooping-coughs not complicated with broncho-pneumonia; it is so often observed that Guéneau de Mussy has considered it to be the cause of the paroxysms. The tracheo-bronchial adenopathy exhibits varying degrees, being at times mild and again extremely pronounced. Hypertrophy is usually simple. The ganglia are voluminous and red, their tissue being hard without trace of softening or relaxation. Sometimes the ganglia are soft and caseous, and the case then is one of whooping-cough complicated with tuberculosis.

The tracheo-bronchial adenopathy seems to be conditioned by the bronchitis, for it is absent in simple whooping-cough without inflammation of the tracheal and bronchial mucous membrane.

Apart from the respiratory apparatus, the organs present few important lesions. Most of the altera-

tions reported as observed in the liver, in the kidneys and in the other organs proceed from the hyperæmia, and appear to be the consequence of infectious lesions.

In recapitulation: When performing autopsy on a subject who has succumbed to whooping-cough, we commonly find hyperæmia of the laryngeal, tracheal and bronchial mucous membrane. The mucous membrane of the bronchi exhibits a deep red coloration. At times this membrane is thickened and œdematous, secreting an abundant mucus. The little bronchi are dilated and filled with muco-pus. The lungs are almost always augmented in volume, and are emphysematous, particularly at the level of the upper lobes. Most commonly they present the manifest lesions of broncho-pneumonia, with intense congestion more or less generalized. The tracheo-bronchial ganglia are usually augmented in volume. With these broncho-pulmonary lesions there exist signs of generalized venous congestion extending to the entire venous system and manifesting itself in all the organs.

Thus we see that these lesions are in no wise characteristic; they are simply what may be observed in any infectious malady. What is peculiar to whooping-cough is the frequency of broncho-pneumonia and hyperæmia of the respiratory passages. These lesions are not sufficient to form an anatomical diagnosis of whooping-cough.

NATURE OF WHOOPING-COUGH.

Numerous theories have been formulated respecting the nature of whooping-cough. Their enumeration would be superfluous, for many of them possess only an historical interest. For convenience of study, they may be divided into three groups. According as the writers have been struck by the predominance of this or that element of whooping-cough, the latter has been treated as a neurosis, as a catarrhal affection, or as an infectious malady.

The theory which makes of whooping-cough a nervous affection relies for support on the spasmodic character of the paroxysms and on the nervous lesions which have been observed in various autopsies. To this theory it may be objected that the lesions of the nervous system are inconstant and often are even absent. Their seat and their nature are variable. The nervous phenomena are evident in the disease; but, whatever their importance, they should not cause us to neglect the other elements, and they fail to explain either the evolution, the absence of relapse, or the contagiousness which does not exist in simple neuroses.

The catarrhal element is the dominant feature of whooping-cough to those authors who would have us regard the disease as a simple inflammatory catarrh of the mucous membrane of the air-passages. The theory of Beau and of Gendrin is the most celebrated

of the inflammatory theories, which are open to the same objections as the nervous theory, since they explain neither the evolution nor the contagiousness. In comparing whooping-cough with a laryngeal bronchitis, we fail to explain why whooping-cough is accompanied with special characteristic paroxysms, whereas neither laryngitis nor common bronchitis is accompanied with a comparable spasmodic cough.

To obtain a satisfactory idea of the nature of whooping-cough, it is indispensable that we take into account, first of all, the capital fact that the malady is contagious. The contagiousness of the disease places it indubitably in the group of infectious maladies due to an animated virus capable of propagating itself and of living amid the conditions of the appropriated environment. Thanks to this characteristic, whooping-cough has a place by the side of measles, scarlatina, smallpox, typhoid fever, etc.—diseases to which it is further allied by the fact that the organism which has once been invaded by its virus is preserved from subsequent attack.

Whooping-cough, regarded as an infectious malady, is indeed lacking in specific symptoms analogous to the eruptions of the exanthematous fevers, and to the eruption of the lenticular rose-spots of typhoid fever. The sublingual ulcerations, erroneously considered by Delthil as special to whooping-cough, are in truth only a commonplace symptom without specific character.

The paroxysm is the truly special symptom of whooping-cough, and its importance is such that we may affirm that the virus of the disease becomes peculiarly localized in the respiratory passages, and brings its action to bear, through the intermediation of the mucous membrane of the air-passages, on the nervous ramifications of the bronchi and larynx. The virus, acting by a special process on the respiratory organs, produces functional disturbance which manifests itself clinically by the paroxysmic cough and by the bronchial hypersecretion.

The virus of the disease seems to exert a special action on the nerves, especially on the pneumogastric and its branches. This action is the source of the paroxysmic triad: the spasmodic cough, the bronchial hypersecretion, and the vomiting. The virus of whooping-cough, like that of herpes, brings its action to bear on the nerves. The special microbic infection of the broncho-pulmonary nervous system, the infection by a virus probably microbic, the localization of the action of this virus on the pneumogastric and its branches,—such seems to be the cause of the malady. The complications are superadded infections, with no characteristics special to whooping-cough; they attack the bronchi and lungs by preference, in consequence of the reduced resisting power of the pulmonary nervous system previously influenced by the virus.

Among the theories respecting the nature of

whooping-cough, that of Guéneau de Mussy merits special mention; he would have us regard the special symptoms of the disease as due to hypertrophy of the mediastinal ganglia. The paroxysm, he claims, is caused by irritation of the fibres of the pneumogastric, which are compressed by these ganglia. We may object to this theory on the ground that the hypertrophy is not uniform, and that it exists in other diseases which are not accompanied with the special symptoms of the paroxysm.

TREATMENT OF WHOOPING-COUGH.

The best treatment of whooping-cough continues to be the symptomatic. There is no specific medication which will dispel the paroxysms or abridge with certainty the duration of the disease.

Medicine is not, however, impotent in the presence of whooping-cough. There are a number of therapeutic agents which enable us to act effectively on certain symptoms, and to influence favorably the course of the malady.

Before proceeding to study the general treatment of the disease and its different symptoms, a few words must be said about its prophylaxis. Whooping-cough being a preventable malady, we must needs know how to prevent it.

Prophylaxis of Whooping-Cough.—The contagion of whooping-cough may be imparted directly by a patient to a healthy subject, or indirectly through an intermediary.

The prophylactic rules relative to direct contagion are simple. Contact between the healthy and the diseased must be absolutely prevented—and it should be remembered that an extremely brief contact, sometimes for only a few minutes, suffices for the contagion. The duration of the contact is immaterial; a single paroxysm is sufficient. As it is almost certain that the germ is contained in the products of expectoration, the child must be watched during the

paroxysm, and must be made to expectorate into a receptacle containing a disinfectant liquid, such as strong carbolic acid or permanganate of potash in a solution of 2 to 1000.

Indirect Contagion.—Indirect contagion is that which occurs through intermediaries.

When whooping-cough attacks a child in a family, may the parents or children, free from the disease, visit other children living in a different house, without fear of bearing with them the germ of the malady? If a physician be treating a whooping-cough subject, must he fear that he will carry the germ to other children whom he is going to visit?

Indirect contagion, effected under these circumstances, is admitted by Joseph Franck and by Rosen. H. Roger cites one case, which I have reported, wherein the indirect contagion was certain.

Indirect contagion through healthy persons is possible, though exceptional. Hence it must be enjoined on those attending a young sufferer from whooping-cough, that they avoid seeing other children. The interdiction is especially necessary when there is a possibility of contaminating new-born infants, for whooping-cough transmitted to the latter is peculiarly dangerous by reason of the tender age of the patients. When dealing with children of the same family, whom the parents refuse to discontinue seeing, when a serious reason such as a disease attacking the separated children renders these visits

proper, it then becomes incumbent upon the parents to take those measures which the physician treating the whooping-cough sufferers should take himself. The clothing must be changed. The face, the hair, the hands must be washed with a sublimate solution of fifty centigrammes to the liter. As for the physician, it will be best for him to provide a garment in the domicile of the patient, which he may put on when approaching the latter and remove on the termination of the visit.

It is well to promenade as much as possible in the fresh air before visiting other whooping-cough patients.

Indirect contagion through the garments and bed clothing has not yet been positively demonstrated. It should, however, be regarded as possible, contagion through healthy persons rendering it very probable. It will therefore be necessary, after the termination of the whooping-cough and before permitting the return of the children who have escaped the disease to the family home, to disinfect the furniture, the clothing, and the apartment.

Duration of the Contagion.—Whooping-cough must be regarded as contagious so long as there are paroxysms. During convalescence, if the paroxysms still persist, even at long intervals, the contagion is yet to be feared, though we may admit that it is doubtful and even improbable if the paroxysms of the third period are no longer accompanied with expectoration.

The whooping-cough once cured, should a paroxysmic cough occur on the occasion of a subsequent bronchitis or other acute disease, the contagion is no more to be feared.

General Treatment of Whooping-Cough.—The ideal treatment of whooping-cough would destroy the infectious agent or prevent its germination in the economy, without causing the patient to suffer from its employment. This ideal treatment does not exist. There is no specific medication which can be directed with certitude of success against the infectious agent of whooping-cough. Numerous essays have been made along these lines, but up to the present time they have remained fruitless. A large number of therapeutic agents seemed for a certain time to encourage the tentatives of experimenters; but the success obtained proved ephemeral. Many medicaments have been proposed; the majority are now forgotten. Some, however, are capable of rendering real service, and merit enumeration.

Whooping-cough comprises three elements: the infectious, the catarrhal, and the spasmodic. Each of these elements should receive the attention of the physician, and each has its corresponding therapeutic indication.

Therapy of the Infectious Element.—Quinine has been frequently employed in the treatment of whooping-cough, being at times administered by mouth, and again in hypodermic injections. It has been vaunted

by Campbell and by Bing. Hubner has employed it with twelve children; in three of these the duration of the malady was abridged, and in five the paroxysms were rendered less violent.

The salts of quinine most commonly employed are the sulphate and tannate. The dose is generally one decigramme per year and one centigramme per month of patient's age.

Inasmuch as the ingestion of quinine fatigues the stomach, the hydrochlorate or valerianate may be administered with convenience in the form of a lavement. In adopting this mode of administration, the following may be prescribed:

Valerianate of quinine, in full doses, according to age.
Infusion of valerian, 100 grammes.

That the lavement may be retained, the physician should see to it that a simple lavement of water is administered a quarter of an hour before the medicinal lavement in order to empty the intestine.

Salicylate of soda has been recommended by Hubner, who claims that it shortens the term of the disease and reduces the violence of the paroxysms. This medicament is given in the dose of 50 centigrammes up to one year of age, and of one gramme at from one to four years of age. Beyond this age the dose is two grammes. Salicylate of soda may be administered dissolved in a sweetened infusion of polygala or eucalyptus. Children will take it readily in currant or cherry syrup added to carbonated water.

Resorcin, recommended by Moncorvo (of Rio de Janeiro), has been employed by that author in the form of a solution of 1 to 100, painted on the orifice of the larynx.

Carbolic acid has been given internally by Sulkling, Macdonald, and Simpson. Simpson, who treated 240 patients with this acid in the form of a potion, declares that not a single case terminated fatally. The carbolic acid has been especially employed externally—in powder applied with the pulverizer, or in solution in the form of spray.

Thyme has been recommended by Neavius in the form of an infusion (10 grammes of thyme to 70 grammes of water; daily dose, eight to twelve spoonfuls of this infusion). Neavius affirms that with this medicament the whooping-cough has always yielded ground within fifteen days and without the appearance of complications. This success is attributed by him to the antiseptic action of the thymol.

Thymol has been employed by Bouchut and by Poulet.

Boric acid has been recommended by Halloway, who prescribes the nasal insufflation of 15 centigrammes of boric acid every three hours. Twenty-four patients, two of whom had pneumonia, were treated and cured by this method, the duration of the disease varying from fourteen days to three weeks.

Insufflations of antiseptic powder were administered by Moizard and Cartaz and yielded remarkable

ease. This (the only rational) treatment has not yet yielded completely satisfactory results. Moreover, the medication does not seem to influence the catarrhal and inflammatory element which is so often present. This catarrhal element should be combated, for it plays an important rôle in the development of the pulmonary complications which impart gravity to whooping-cough. To overcome this element, two means are at our command: the emetics, and medicaments which act on the bronchial secretions.

The emetics have long been employed in the treatment of whooping-cough. Intelligently administered they yield good results, and constitute so far the best treatment of the catarrhal element. It is not very probable that they modify the bronchial secretion; but it is certain that they favor mechanically the expulsion of the mucosities whose presence in the bronchi is one of the causes of the paroxysm. Given at frequent intervals, the emetics permit the mechanical evacuation of the bronchial mucus and diminish the number and intensity of the paroxysms. That the emetic treatment may be really efficacious, it must be prolonged and repeated. These agents should be given when the stomach is empty, that is, a certain time after meals, preferably in the morning.

It may be objected that if there be repeated vomiting, there is no rational ground for administering emetics. This is an error, for spontaneous vomiting expels the food and gastric mucus—rarely the bronchial mucosities.

The depressing emetics such as antimony and potassium tartrate, sulphate of copper and apomorphine, must be rejected in view of their depressing action.

The emetic universally recommended and adopted is ipecac; and this agent, in order to fulfill the therapeutic purpose in view, should be given in small doses in the form of the syrup. It should be administered preferably every day—or rather every two days in the morning, on an empty stomach.

For children less than a year old, syrup of ipecac will suffice. These infants are to take two or three teaspoonfuls of the medicament. If necessary, the dose should be augmented until vomiting occurs once or twice.

For older children, up to two years of age, add to the syrup of ipecac one decigramme of powdered ipecac; two decigrammes and three decigrammes for children four years of age and more. In the case of the latter a tablespoonful of syrup of ipecac should replace the teaspoonful given to the younger children.

By reason of its expectorant properties, *white oxide of antimony* may be given in place of ipecac to children in whom gastric susceptibility is feared. By the method of Trousseau it is administered in a white lincture (*looch*), giving a tablespoonful every two hours. The formula of Trousseau was as follows:

White oxide of antimony..... up to 1 gramme.
White lincture..... 150 grammes.

Or the oxide of antimony may be administered mixed with cherry-laurel water in the following formula:

White oxide of antimony.....	50 centigrammes.
Cherry-laurel water.....	1 gramme.
Infus'n of eucalyptus or hyssop.	100 grammes.
Syrup of tolu.....	50 grammes.

One tablespoonful every two hours.

Finally, the dose of 50 centigrammes may be divided into ten packets, and each packet given in a small cup of an infusion of polygala or peppermint.

While endeavoring with the aid of emetics to facilitate the expulsion of the mucous matter, the physician must seek to diminish the bronchial secretions with the aid of the medicaments reputed to possess this power. The agents which fulfill this indication are: terebinthin, eucalyptus, *Pinus canadensis*, etc.; any of these may be given to children with advantage in the form of syrup which serves to sweeten a hot infusion.

If the whooping-cough be accompanied with considerable hypersecretion, it will be proper to give creosote, guaiacol, or eucalyptol, two to three drops, as in the following formula:

Creosote.....	2 drops.
Water	90 grammes.
Orange-flower water.....	30 grammes.
Lemon essence.....	2 drops.

—*Pécholier.*

In view, however, of the acrid taste of these medicaments, it will be better to administer them in the form of inhalations.

Treatment of the Spasmodic Element.—The third indication to fulfill in the general treatment of whooping-cough consists in combating the spasmodic element, for the purpose of diminishing the number and intensity of the paroxysms.

Belladonna was long regarded as the medicament best responding to this indication. Its efficacy appeared so great to Hufeland that he regarded it as the specific of whooping-cough. Trousseau praised its effects and declared that they were almost infallible. Without fully conceding the truth of this opinion, we may consider belladonna as an excellent antispasmodic yielding good results in the treatment of whooping-cough. I have almost always employed it with success.

Belladonna may be administered in pills and in powder, or in the form of tincture, syrup or potion.

The dose of belladonna extract, given in pills, is one-half centigramme up to one year of age; one centigramme up to two years. Beyond this age, two centigrammes are given in two doses.

The following formula may be prescribed:

Belladonna extract.....	10 centigrammes.
Extract of valerian } Oxide of zinc } āā.....	2 grammes.

For twenty pills. One, two or three pills, according to age.

The powdered belladonna is administered alone or mixed with some infusion. The does varies from three to eight centigrammes, according to age, as stated in one of the following formulas:

Powdered belladonna-root...	4 to 8 centigrammes.
Sugar.....	25 centigrammes.

For one dose.

Extract of belladonna.....	5 to 20 centigrammes.
Sugar.....	5 grammes.

For ten doses.

Administered in potion, belladonna extract may be prescribed with one of the following formulas:

Extract of belladonna.....	2 to 5 centigrammes.
Cherry-laurel water.....	1 gramme.
Camphor-water.....	10 grammes.

One spoonful every two hours.

Tincture of belladonna.....	1 gramme.
Simple syrup.....	20 grammes.
Lime-flowers water (*Aqua linden*)	130 grammes.

To be given in spoonfuls.

Extract of belladonna.....	5 centigrammes.
Extract of conium.....	2 centigrammes.
Pure tannin	30 centigrammes.
Infusion of senna.....	60 grammes.
Fennel-water	30 grammes.
Syrup of althæa...	25 grammes.

Give a dessertspoonful every two hours.

—*Bouchut.*

Finally, syrup of belladonna is readily taken in the dose of five to ten grammes either alone or with any aromatic infusion.

Other medicaments may also favorably influence the paroxysms. Opium has been recommended and has yielded good results in the hands of several observers. Its employment does not, however, seem to merit recommendation, in view of the susceptibility of children to this medicament.

Chloral has been essayed repeatedly. According to Hubner, it is capable of abridging the paroxysms and rendering them less violent. This medicament may be prescribed in the form of a syrup containing one gramme of chloral, by the tablespoonful, to be taken several times during the twenty-four hours. Chloral, as I have seen it employed methodically by Joffroy at the Hospital for Sick Children, appears to reduce sensibly the number of the paroxysms. The graphic summaries of the number of paroxysms noted before and after the administration of the medicament show this in a striking manner. Unfortunately, chloral at times gives rise to an abundant eruption of livid red spots covering a large expanse of skin, which necessitates its suppression. Moreover, it is frequently ill-tolerated by the stomach.

Bromide of potassium seems to have no action on the paroxysms; such, at least, is the opinion of Hubner, who obtained no results.

Bromoform has been employed by Stepp. With a dose of three to six drops of this medicament, according to his claims, the vomiting ceases rapidly. The paroxysms become more rare and less intense. Cure follows in the course of two to four weeks.

Chloroform was introduced by H. Roger in the therapy of whooping-cough. This author gave from six to forty drops of it in a gummy potion, to be taken in twenty-four hours. He began with six drops, and added two drops every day. In patients who took the chloroform, the paroxysms of cough generally diminished a third at the end of eight days.

Chloroform has been further employed in inhalations. Schilling has treated sixty-two cases of whooping-cough by inhalations of chloroform and chloroform-water, and claims that he has had no failures.

The hydrochlorate of cocaine has been employed in diverse manners. Wintraub has administered it internally in a potion. Most commonly the medicament has been prescribed for external use. Forster, Emmet-Halt, Labric, Barbillion, and d'Heilly have met with success in its use.

Labric and Barbillion prescribe that the pharynx, larynx, and tonsils be painted with a solution of hydrochlorate of cocaine, 5-per-cent. These applications diminish the number of paroxysms and suppress the vomiting.

Prior recommends painting the larynx with a 15-per-cent. solution of cocaine.

Finally, syrup of belladonna is readily taken in the dose of five to ten grammes either alone or with any aromatic infusion.

Other medicaments may also favorably influence the paroxysms. Opium has been recommended and has yielded good results in the hands of several observers. Its employment does not, however, seem to merit recommendation, in view of the susceptibility of children to this medicament.

Chloral has been essayed repeatedly. According to Hubner, it is capable of abridging the paroxysms and rendering them less violent. This medicament may be prescribed in the form of a syrup containing one gramme of chloral, by the tablespoonful, to be taken several times during the twenty-four hours. Chloral, as I have seen it employed methodically by Joffroy at the Hospital for Sick Children, appears to reduce sensibly the number of the paroxysms. The graphic summaries of the number of paroxysms noted before and after the administration of the medicament show this in a striking manner. Unfortunately, chloral at times gives rise to an abundant eruption of livid red spots covering a large expanse of skin, which necessitates its suppression. Moreover, it is frequently ill-tolerated by the stomach.

Bromide of potassium seems to have no action on the paroxysms; such, at least, is the opinion of Hubner, who obtained no results.

Bromoform has been employed by Stepp. With a dose of three to six drops of this medicament, according to his claims, the vomiting ceases rapidly. The paroxysms become more rare and less intense. Cure follows in the course of two to four weeks.

Chloroform was introduced by H. Roger in the therapy of whooping cough. This author gave from six to forty drops of it in a gummy potion, to be taken in twenty-four hours. He began with six drops, and added two drops every day. In patients who took the chloroform, the paroxysms of cough generally diminished a third at the end of eight days.

Chloroform has been further employed in inhalations. Schilling has treated sixty-two cases of whooping cough by inhalations of chloroform and chloroform water, and claims that he has had no failures.

The hydrochlorate of cocaine has been employed in diverse manners. Wintraub has administered it internally in a potion. Most commonly the medicament has been prescribed for external use. Forster, Emmet, Hall, Labric, Barbillion, and d'Heilly have met with success in its use.

Labric and Barbillion prescribe that the pharynx, larynx, and tonsils be painted with a solution of hydrochlorate of cocaine, 5 per cent. These applications diminish the number of paroxysms and suppress the vomiting.

Prior recommends painting the larynx with a 15 per cent. solution of cocaine.

Emmet-Halt employs cocaine in the form of inhalations. He causes the patient to inhale ten drops of a 6-per-cent. solution in chloroform, and claims to obtain an immediate arrest of the paroxysms.

D'Heilly paints the isthmus of the pharynx, and immediately after the laryngeal orifice, with a 5-per-cent. solution. He declares that these applications always diminish the intensity of the paroxysms, perhaps also their number, and suppress the vomiting.

Those who fear this form of application may follow the example of Forster and administer the remedy in the form of a cocaine spray.

The use of analgesin (antipyrin) has been recommended by Genser, Jeffrier, Sonnenberg, Griffits, etc. This medicament, tested on a vast scale by Legroux and by Dubousquet-Laborderie, at the present time enjoys great favor in the treatment of whooping-cough. Dubousquet-Laborderie claims to have observed its success in nearly 200 out of a total of 300 cases of whooping-cough.

Those writers who laud the properties of analgesin state that, administered from the *début* of the spasmodic period in doses varying from fifty centigrammes to two grammes, this medicament rapidly diminishes the number of the paroxysms; it may even suspend them, at least momentarily, but they recur as soon as the medicament is discontinued.

I have several times had occasion to employ analgesin in the treatment of whooping-cough. The

doses were one gramme (six months to a year); two grammes up to three years; and three grammes beyond three years. Generally the results proved satisfactory. Analgesin diminished the number of paroxysms by a third in most cases. It never suppressed them completely. In two cases of grave whooping-cough with abundant vomiting, it had no effect on the latter.

My experience, comprising fifteen cases, shows that the action of analgesin is real but that it is not superior to that of belladonna. Analgesin, however, is to be recommended, for it is generally well tolerated and is entirely innocuous. It yields good results, but I do not consider it a specific medicament possessing all the value attributed to it by certain authors.

TREATMENT OF SYMPTOMS.

GENERAL HYGIENE.

In the preceding chapter we have had in view the general treatment of whooping-cough. We have reviewed the forms of medication whose purpose is to overcome the malady itself and abridge its duration. It remains for us to study the treatment of each period and of each symptom by itself.

During the first period the phenomena of catarrh alone exist; diagnosis is yet impossible, save under certain specially observed conditions. Since the children present only the symptoms of bronchitis, the sole treatment applicable is that of bronchial catarrh. The best treatment of any affection of this kind in children is the expectorant and emetic; and this method should be employed in the first period of whooping-cough. The children should be subjected to the use of emetics (ipecac) every day or every two days. Prescribe at the same time a cough potion intended to calm the irritation of the respiratory organs. This symptomatic treatment is the only rational mode, for we have no means of arresting the evolution of whooping-cough. Even in the first period the disease cannot be checked.

If, for special reasons, it is to be feared that the bronchitis is the *début* of this period of whooping-cough, we can then begin with advantage the anti-

septic treatment by insufflations and inhalations and give internally sulphate of quinine or, preferably, analgesin.

During the first period the child should keep his room, as in any bronchitis.

During the second period the paroxysms dominate the scene. We must then seek to prevent their increase in number, and to reduce their intensity, by the ordinary means of general treatment. Among these means, the insufflation of antiseptic powders, the application of solutions of cocaine, the administration of analgesin, belladonna, and sulphate of quinine, are indicated.

The special treatment of the paroxysm merits particular attention. First of all we must endeavor to remove the most common causes. For this purpose the child is to be guarded against the emotions to which his age is so susceptible. He must be forbidden from indulging in violent play; he must not pass suddenly from a heated room into the fresh air, etc., etc. The paroxysm once begun, the child instinctively assumes the positions which during the crisis facilitate the action of the accessory respiratory muscles. He should be assisted and furnished the necessary points of support.

The paroxysm is often prolonged by the difficulty which the children experience in expelling the glairous matters of expectoration. It is then proper to relieve the mouth and throat of the mucosities with

which they are filled, by means of the finger or of a brush touched against the pharynx.

When the paroxysms are very severe it is well to have the patient inspire a little chloroform or ether. With one child, whose paroxysms were extremely violent, I found it very beneficial to administer in this fashion several drops of iodide of ethyl. The inhalation of ten drops diminished the intensity of the paroxysms.

Sometimes a simple mechanical excitation suffices to diminish the violence of the spasm. Kurt claims to have checked paroxysms of whooping-cough by exciting the mucous membrane of the conjunctiva or of the nasal fossa with a goose-feather, charged or not with a mixture of quinine and sugar or with analgesin. He attributes to a reflex action of the trigeminal on the pneumogastric this effect of the mechanical excitation of the ocular and nasal mucous membranes, producing an arrest of the spasmodic movements characterizing the paroxysm.

The vomitings which so often accompany the paroxysms, and which also occur independently of them, should be combated, by reason of the profound disturbance of nutrition which they may determine. When they are purely mechanical it is well to give the food immediately after the paroxysms, that it may be digested and absorbed ere another paroxysm can follow. The food should be very nourishing, small in volume, and should consist of meat broths (*purées*),

eggs, etc. Thin soups are to be proscribed; liquids are to be administered in small quantity. In a certains number of cases, powdered beef may be employed with advantage. Coffee, according to Guyot's claim, finds an indication against the vomitings. The food seems to be better tolerated when the repast is followed by drinking a small quantity of coffee (a dessertspoonful after each mouthful of food). In short, the repasts should be numerous, but small in quantity. The child should take frequently a few grammes of solid food, preferably after the paroxysm.

When the vomitings are very frequent and supervene after each meal, nutrition languishes, the child becomes enfeebled and wastes away.

Under such circumstances alimentation with the aid of the œsophagal tube often becomes a necessity. The sound should be employed with prudence, and gently introduced, for its introduction may provoke a paroxysm. In connection with the use of this method, we may likewise prescribe nutritive enemata containing eggs, powdered beef rendered alkaline, assimilable peptone, etc.

With all young infants refusing to take the breast, the physician is often obliged to have recourse to alimentation by the sound, to gavage, or to enemata of milk.

May the patients be permitted to go out during the second period of whooping-cough, or are they to keep their rooms? In serious cases of the disease

confinement to the room is absolutely essential. In cases of mean intensity, some physicians permit a promenade, under favorable conditions, that is, in the middle of the day when the temperature is favorable. In my judgment it is better not to authorize this change, for experience has demonstrated that it favors the complications of bronchitis and broncho-pneumonia. In several cases I have assured myself that the number of paroxysms was thus augmented. In mild cases, and when the paroxysms have shown a manifest and long-continued diminution, confinement to the room is less necessary; promenades may then be permitted on condition that they occur amid good conditions and that they be of short duration.

During the third period, there is no longer any question of treatment for the vanishing disease. The problem then becomes: how to combat the debility produced by the disease.

If the whooping-cough has been mild, if the child is vigorous and of sound constitution, a tonic and reparatory regimen is sufficient. In addition, care must be taken to prevent chills, which may produce bronchitis or provoke a relapse or reappearance of the paroxysms.

Before terminating the isolation of the patient and permitting the other children to return to the family home, it is indispensable to prescribe the necessary disinfection of the apartments and clothing.

If whooping-cough has attacked delicate children

predisposed to bronchial catarrh, or lymphatic or scrofulous children, convalescence should be attentively observed. The fortifying agents in all their forms (cod-liver oil, iodide of iron, etc.) are then indicated.

Occasionally the third period becomes abnormally prolonged. The acute period of whooping-cough is finished, but the paroxysms persist at rare intervals and will not finally vanish. At times the bronchial catarrh is even observed to persist, and this may render the whole situation dubious and result in the possible tardy supervention (though rarely) of a complication of broncho-pneumonia. In these forms of persisting whooping-cough, the arsenical preparations in the form of the granules of Dioscorides (one to two a day), of Fowler's solution (dose four to six drops daily), of solution of arsenate of soda (a half-teaspoonful of a solution of five centigrammes arsenate of soda in 200 to 300 grammes of water mixed with milk), frequently exhibit a real efficiency.

Where the persistence of whooping-cough is abnormal, change of residence has been frequently and very properly recommended. This empirical measure is often successful. The indications for a change of air should, however, be set forth with precision. Change of residence is useless and may even prove dangerous during the second period. During the third period it is useful provided it occurs in a rational manner. Thus, it is well to leave the city in

summer and take the whooping-cough convalescent into a healthy country district sheltered from winds and free from humidity. In winter a temperate climate is to be recommended.

Most authors counsel such change of residence, and cite cases of rapid cure occurring amid such conditions. It may accordingly be recommended to the parents, who will seldom fail to propose the measure themselves. The physician should only take heed of the climatic conditions prevailing in the place to which the child is to be sent.

So long as whooping-cough manifests itself by paroxysms, however rare, sojourn at the sea-coast should be forbidden. It is to be permitted only after several weeks have followed the disappearance of the malady.

If a change of domicile is impossible, aërotherapy may be recommended in the form of baths of compressed air. This measure often yields good results. It is useful in the anæmia which may follow the malady, and is, moreover, an excellent treatment for the emphysema which commonly accompanies and follows whooping-cough. This mode of treatment is easy of application with children.

Treatment of the Complications.—The most important and serious of the complications (bronchopneumonia, tuberculosis in all its forms) are the secondary infections. Thanks to an intelligent prophylaxis and a rigorous hygiene, children may be

withdrawn from the danger of these to a certain extent. For this purpose isolation is the essential condition. Readily carried out in the city, isolation is generally efficacious, for the whooping-cough of the city is much more rarely complicated with broncho-pneumonia and tuberculosis than the disease in the hospital.

In the latter, isolation is necessary in the interest of the occupants free from whooping-cough, and of the whooping-cough sufferers who may thus more readily avoid tuberculosis and the superadded infections. Inasmuch as the isolation and treatment of whooping-cough subjects in the same ward does not exclude the danger of broncho-pneumonia, the ideal condition will be realized when each patient is treated in a separate room. This ideal is fulfilled with difficulty, but we may at least demand that every whooping-cough subject attacked with broncho-pneumonia or tuberculosis be immediately separated from the rest. If the principle of isolation be carried out, whooping-cough will be rarely complicated with broncho-pneumonia or tuberculosis, and the prognosis of the disease in the hospital will cease to be as grave as it now is.

Prophylaxis thus applied may supply the whooping-cough subject a shield against microbes coming from other diseases. But we must not forget that certain pathogenic microbes (the pathogenic streptococcus of broncho-pneumonia, for example) normally

inhabit the mouth. It is therefore well to destroy them or diminish their virulence by internal antisepsis, performed by lavage of the mouth with solutions of boric acid or naphthol, by nasal irrigations, or, better still, by the insufflation of antiseptic powder.

Once declared, the broncho-pneumonia of whooping-cough falls within the sphere of its ordinary treatment. The most beneficial general treatment continues to be the tonic treatment by alcohol in large doses. Locally, the congestive symptoms are to be combated by dry cupping and mustard plasters. If the broncho-pneumonia tends to present a localized focus, vesicatories of small dimension, readily renewable, and the conical cautery are indicated. The latter will be found particularly useful in chronic broncho-pneumonia, which is more frequent in whooping-cough than in any other malady.

In some cases, after apprising the parents of the gravity of the situation, we may essay the use of cold baths or the cold pack, repeated several times daily—applying a cloth moistened with cold water. This measure is justified by the intensity of the cutaneous congestion which it determines. It constitutes the most powerful revulsive at our command, and is at the same time an excellent sedative to the nervous system.

Two complications, unhappily almost always fatal, by reason of their immediate gravity demand prompt intervention. These are: the convulsions, and the glottic spasm.

The eclampsia is of extreme gravity, killing one whooping-cough sufferer out of every ten. To combat it we may employ the stupefying agents—inhalations of chloroform, bromide of potassium in the dose of fifty centigrammes to one gramme, chloral given in lavements. Warm baths are also to be prescribed.

Eclampsia is accompanied with hyperæmia of the brain, verified on autopsy, which justifies resort to bleeding. It may therefore be combated from the outset by leeches applied behind the ears and by wet cups to the neck. If the case is ominous, a general bleeding may be essayed, and would be justified by the gravity of the situation.

Though I have had no personal experience with this mode of treatment, I believe that when eclampsia supervenes, cold water applied in the form of repeated baths or of the moist pack will yield good service. The eclampsia being due to hyperæmia of the encephalon, cold water would be an efficacious means of inducing a flow of blood to the periphery.

In spasm of the glottis, the accidents commonly follow one another with such rapidity that death occurs before we have time to come to the child's rescue. Whenever, for any reason, this accident is to be dreaded, the persons attending the children should be apprised of what they are to do in case the accident occurs.

When spasm of the glottis is incomplete it is

sometimes terminated by causing the patient to respire several drops of acetic acid or ammonia-water, the attendant meanwhile performing energetic friction of the body with vinegar.

When the spasm is more intense and prolonged, it is well to perform artificial respiration by raising and lowering the arms and by exciting the region of the diaphragm in every possible way—by faradization if it be available. Mayor's hammer, applied to the thorax and abdomen, is an efficacious means, according to the experience of Du Castel, of regulating the respiratory movements.

Du Castel and his master Labric absolutely discourage the employment of the measure recommended by Rosen of Rosenstein, which consists in provoking vomiting by introducing the finger into the child's mouth.

When all means have proved futile, if death be imminent, tracheotomy is the supreme resource.

IMPROVED LOFOTEN COD-LIVER OIL

We take pleasure in introducing to the notice of Medicine and Pharmacy our

IMPROVED LOFOTEN COD-LIVER OIL,

Which we claim is superior to any other on the American Market.

It is prepared with a special view of ensuring

PERMANENCY, PALATABILITY AND THERAPEUTIC EFFECT.

Our **Lofoten Cod-Liver Oil** is *nearly tasteless and odorless*, and the many disagreeable effects which in former times followed the use of cod-liver oil are almost entirely avoided.

Its superiority to emulsions is very marked. Palatability is the chief advantage possessed by emulsions, but now that **Lofoten Cod-Liver Oil** has been rendered so palatable there seems to be little occasion to administer mixtures containing acacia, which is itself a calcium salt and has no place among foods.

A SAMPLE and our literature upon the History, Pharmacy, Chemistry and Therapeutics of Cod-Liver Oil promptly mailed upon request.

PARKE, DAVIS & COMPANY,

DETROIT, NEW YORK, KANSAS CITY, U. S. A.,

AND WALKERVILLE, ONT.

BULLETIN OF PUBLICATIONS

— OF —

GEORGE S. DAVIS, Publisher.

THE THERAPEUTIC GAZETTE.

A Monthly Journal of Physiological and Clinical Therapeutics.

EDITED BY

H. A. HARE, M. D., G. E. DeSCHWEINITZ, M. D., EDWARD MARTIN, M. D.

SUBSCRIPTION PRICE, $2.00 PER YEAR.

THE INDEX MEDICUS.

A Monthly Classified Record of the Current Medical Literature of the World.

COMPILED UNDER THE DIRECTION OF

DR. JOHN S. BILLINGS, Surgeon U. S. A.,
and DR. ROBERT FLETCHER, M. R. C. S., Eng.

SUBSCRIPTION PRICE, $10.00 PER YEAR.

THE AMERICAN LANCET.

EDITED BY

LEARTUS CONNOR, M. D.

A MONTHLY JOURNAL DEVOTED TO REGULAR MEDICINE.

SUBSCRIPTION PRICE, $2.00 PER YEAR.

THE MEDICAL AGE.

A Semi-Monthly Journal of Practical Medicine and Medical News.

SUBSCRIPTION PRICE, $1.00 PER YEAR.

THE WESTERN MEDICAL REPORTER.

EDITED BY

J. E. HARPER, A. M., M. D.

A MONTHLY EPITOME OF MEDICAL PROGRESS.

SUBSCRIPTION PRICE, $1.00 PER YEAR.

THE BULLETIN OF PHARMACY.

A Monthly Exponent of Pharmaceutical Progress and News.

SUBSCRIPTION PRICE, $1.00 A YEAR.

New subscribers taking more than one journal, and accompanying subscription by remittance, are entitled to the following special rates:

GAZETTE and AGE, $2.50; GAZETTE, AGE and LANCET, $4.00; LANCET and AGE, $2.50; WESTERN MEDICAL REPORTER or BULLETIN with any of the above, except the Index Medicus, at 20 per cent. less than regular rates.

Combined, these journals furnish a complete working library of current medical literature, all the medical news, and full reports of medical progress.

GEO. S. DAVIS, Publisher, Detroit, Mich.

IN EXPLANATION OF

The Physician's Leisure Library.

This series has been universally commended by the medical press and profession; it represents a new era in the publication of medical books.

In the belief that these short practical treatises, prepared by well known authors, containing the gist of what they had to say regarding the treatment of diseases commonly met with and of which they had made a special study, sold at a small price, would be welcomed by the majority of the profession, this form of publication was undertaken.

The books are amply illustrated, and issued in attractive form in durable paper covers, and in cloth.

PHYSICIAN'S LEISURE LIBRARY

PRICE: PAPER, 25 CTS. PER COPY, $2.50 PER SET; CLOTH, 50 CTS. PER COPY, $5.00 PER SET.

SERIES I.

Inhalers, Inhalations and Inhalants.
By Beverley Robinson, M.D.

The Use of Electricity in the Removal of Superfluous Hair and the Treatment of Various Facial Blemishes.
By Geo. Henry Fox, M.D.

New Medications, Vol. I.
By Dujardin-Beaumetz, M.D.

New Medications, Vol. II.
By Dujardin-Beaumetz, M.D.

The Modern Treatment of Ear Diseases.
By Samuel Sexton, M.D.

The Modern Treatment of Eczema.
By Henry G. Piffard, M.D.

Antiseptic Midwifery.
By Henry J. Garrigues, M.D.

On the Determination of the Necessity for Wearing Glasses.
By D. B. St. John Roosa, M.D.

The Physiological, Pathological and Therapeutic Effects of Compressed Air.
By Andrew H. Smith, M.D.

Granular Lids and Contagious Ophthalmia.
By W. F. Mittendorf, M.D.

Practical Bacteriology.
By Thomas E. Satterthwaite, M.D.

Pregnancy, Parturition, the Puerperal State, and their Complications.
By Paul F. Mundé, M.D.

SERIES II.

The Diagnosis and Treatment of Haemorrhoids.
By Chas. B. Kelsey, M.D.

Diseases of the Heart, Vol. I.
By Dujardin-Beaumetz, M.D.

Diseases of the Heart, Vol. II.
By Dujardin-Beaumetz, M.D.

The Modern Treatment of Diarrhoea and Dysentery.
By A. B. Palmer, M.D.

Intestinal Diseases of Children, Vol. I.
By A. Jacobi, M.D.

Intestinal Diseases of Children, Vol. II.
By A. Jacobi, M.D.

The Modern Treatment of Headaches.
By Allan McLane Hamilton, M.D.

The Modern Treatment of Pleurisy and Pneumonia.
By G. M. Garland, M.D.

Diseases of the Male Urethra.
By Fessenden N. Otis, M.D.

The Disorders of Menstruation.
By Edward W. Jenks, M.D.

The Infectious Diseases, Vol. I.
By Karl Liebermeister.

The Infectious Diseases, Vol. II.
By Karl Liebermeister.

SERIES III.

Abdominal Surgery.
By Hal C. Wyman, M.D.

Diseases of the Liver.
By Dujardin-Beaumetz, M.D.

Hysteria and Epilepsy.
By J. Leonard Corning, M.D.

Diseases of the Kidney.
By Dujardin-Beaumetz, M.D.

The Theory and Practice of the Ophthalmoscope.
By J. Herbert Claiborne, Jr., M.D.

Modern Treatment of Bright's Disease.
By Alfred L. Loomis, M.D.

Clinical Lectures on Certain Diseases of the Nervous System.
By Prof. J. M. Charcot, M.D.

The Radical Cure of Hernia.
By Henry O. Marcy, A.M., M.D., LL.D.

Spinal Irritation.
By William A. Hammond, M.D.

Dyspepsia.
By Frank Woodbury, M.D.

The Treatment of the Morphia Habit.
By Erlenmeyer.

The Etiology, Diagnosis and Therapy of Tuberculosis.
By Prof. H. von Ziemssen.

SERIES IV.

Nervous Syphilis.
By H. C. Wood, M.D.

Education and Culture as correlated to the Health and Diseases of Women.
By A. J. C. Skene, M.D.

Diabetes.
By A. H. Smith, M.D.

A Treatise on Fractures.
By Armand Després, M.D.

Some Major and Minor Fallacies concerning Syphilis.
By E. L. Keyes, M.D.

Hypodermic Medication.
By Bourneville and Bricon.

Practical Points in the Management of Diseases of Children.
By I. N. Love, M.D.

Neuralgia.
By E. P. Hurd, M.D.

Rheumatism and Gout.
By F. Le Roy Satterlee, M.D.

Electricity, Its Application in Medicine.
By Wellington Adams, M.D. [Vol.I.]

Electricity, Its Application in Medicine.
By Wellington Adams, M.D. [Vol.II.]

Auscultation and Percussion.
By Frederick C. Shattuck, M.D.

SERIES V.

Taking Cold.
By F. H. Bosworth, M.D.

Practical Notes on Urinary Analysis.
By William B. Canfield, M.D.

Practical Intestinal Surgery. Vol. I.
By F. B. Robinson, M.D.

Practical Intestinal Surgery. Vol. II.
By F. B. Robinson, M.D.

Lectures on Tumors.
By John B. Hamilton, M.D., LL.D.

Pulmonary Consumption, a Nervous Disease.
By Thomas J. Mays, M.D.

Artificial Anaesthetics and Anaesthesia.
By DeForest Willard, M.D., and Dr. Lewi H. Adler, Jr.

Lessons in the Diagnosis and Treatment of Eye Diseases.
By Casey A. Wood, M.D.

The Modern Treatment of Hip Disease.
By Charles F. Stillman, M.D.

Diseases of the Bladder and Prostate.
By Hal C. Wyman, M.D.

Cancer.
By Daniel Lewis, M.D.

Insomnia and Hypnotics.
By Germain Sée.
[Translated by E. P. Hurd, M.D.]

SERIES VI.

The Uses of Water in Modern Medicine.
By Simon Baruch, M.D. Vol. I.

The Uses of Water in Modern Medicine
By Simon Baruch, M.D. Vol. II.

The Electro-Therapeutics of Gynaecology. Vol. I.
By A. H. Goelet, M.D.

The Electro-Therapeutics of Gynaecology. Vol. II.
By A. H. Goelet, M.D.

Cerebral Meningitis.
By Martin W. Barr, M.D.

Contributions of Physicians to English and American Literature.
By Robert C. Kenner, M.D.

Gonorrhoea and Its Treatmen
By G. Frank Lydston, M.D.

Acne and Alopecia.
By L. Duncan Bulkley, M.D.

Fissure of the Anus and Fistula in Ano.
By Dr. Lewis H. Adler, Jr.

The Surgical Anatomy and Surgery of the Ear.
By Albert H. Tuttle, M.D., S.B.

Recent Developments in Massage.
By Douglas Graham, M.D.

Sexual Weakness and Impotence.
By Edward Martin, M.D.

SERIES VII.

Appendicitis and Perityphlitis.
By Charles Talamon, M.D.

Cholera. Vol. I.

Cholera. Vol. II.
By G. Archie Stockwell, M.D., F.Z.S.

Electro-Therapeutics of Neurasthenia.
By W. F. Robinson, M.D.

Treatment of Sterility in the Woman.
By Dr. De Sinety.

Bacterial Poisons.
By N. Gamaleia, M.D.

The Modern Climatic Treatment of Invalids with Pulmonary Consumption in Southern California.
By P. C. Remondino, M.D.

Antiseptic Therapeutics. Vol. I.

Antiseptic Therapeutics. Vol. II.
By E. Trouessart, M.D.

Treatment of Typhoid Fever.
By D. D. Stewart, M.D.

Whooping Cough. Vol. I.

Whooping Cough. Vol. II.
By H. Richardière, M.D.
[Translated by Joseph Helfman.]

GEORGE S. DAVIS, Publisher,

P. O. Box 470 Detroit, Mich.

BOOKS BY LEADING AUTHORS.

A PRIMER OF PSYCHOLOGY AND MENTAL DISEASE..$ 1.00
By Dr. C. B. Burr.

Part I is devoted to the study of the faculties of the normal mind, and these are plainly and clearly set forth. Part II is devoted to mental diseases, causes and forms of insanity being discussed in accordance with an original plan of the author's. Part III deals with the management of cases of insanity.

REACTIONS..... 2.00
By F. A. Flückiger, Ph.D., M.D.

A Selection of Organic Chemical Preparations Important to Pharmacy in regard to their Behavior to Commonly Used Reagents. Translated, revised and enlarged by J. B. Nagelvoort, analytical chemist to the Pharm.-Chem. Laboratory of Parke, Davis & Co. Authorized English edition.

TABLES FOR DOCTOR AND DRUGGIST..... 2.00
Compiled by Eli H. Long, M.D.

Comprising Tables of Solubilities, Reactions and Incompatibles, Doses and Uses of Medicines, Specific Gravity, Poisons and Antidotes, Thermometric Equivalents, and The Metric System. SECOND EDITION—ENLARGED AND REVISED.

THE PHARMACOLOGY OF THE NEWER MATERIA MEDICA—

Price, postpaid, in cloth..... 3.00

Price, postpaid, in sheep..... 3.50

THE PRINCIPLES AND PRACTICE OF BANDAGING.... 3.00
By Gwilym G. Davis, M.D., Universities of Pennsylvania and Göttingen.

The most modern and complete work on bandaging ever issued. Contains 172 illustrations, prepared from sketches especially made for this book by the author, printed from 23 plates on separate pages. The book is handsomely printed on superior quality of paper, with wide margin, and tastefully bound in red cloth.

SEXUAL IMPOTENCE IN MALE AND FEMALE (3d Edition). 3.00
By Wm. A. Hammond, M.D.

Probably more unhappiness is caused by sexual impotence than by any other disease that affects mankind. Dr. Hammond discusses Causes, Symptoms and Treatment.

CLINICAL THERAPEUTICS..... 4.00
By Dujardin-Beaumetz, M.D.

Dujardin-Beaumetz is easily chief in the field of original therapeutic research and in fertility of therapeutic suggestion. This treatise of 491 pages comprises his lectures on the Treatment of Nervous Diseases, General Diseases, and Fevers.

PHYSICIANS' PERFECT VISITING LIST ..... $ 1.50
By G. Archie Stockwell, M.D.

Physicians are generally admitted to be exceedingly poor financiers. There is probably no class of professional men who realize so little financially from their labors. One cause of this is negligence in keeping an account of their work. This call or visiting list has been constructed to enable physicians more easily to keep an accurate record of their services. It is arranged for perpetual use, and every physician should avail himself of this ready and simple method of keeping his accounts on a business basis.

PALATABLE PRESCRIBING (Third Edition)..... 1.00
By B. W. Palmer, A.M., M.D.

This book contains over 600 favorite formulas of the most eminent medical authorities, culled from their published writings and private records, and embraces a résumé of the most eligible preparations for the administration of the more recent additions to the materia medica.

A NEW TREATMENT OF CHRONIC METRITIS. ..... .50
By Dr. Georges Apostoli.

This book of 110 pages, illustrated with cuts of apparatus, presents the details of Apostoli's treatment by intra-uterine Chemical Galvano-Cauterizations of Chronic Metritis and Endometritis.

SANITARY SUGGESTIONS (Paper)..... .25
By B. W. Palmer, M.D.

FORMULÆ FOR THROAT AND LUNG DISEASES..... .25
By E. L. Shurly, M.D.

These are formulæ which Dr. Shurly employs in hospital and private practice, and which he has published at the solicitation of his students.

UNUSUAL BARGAIN!

The following three books will be sold, for a limited time, at half their regular price. Prices quoted are strictly net cash with order.

UNTOWARD EFFECTS OF DRUGS ..... $ 1.00
By L. Lewin, M.D.

MICROSCOPICAL DIAGNOSIS..... 1.50
By Chas. H. Stowell, M.S.

SELECT EXTRA-TROPICAL PLANTS.... ..... 1.50
By Baron Ferd. von Mueller.

GEO. S. DAVIS, Publisher,

P. O. Box 470,

DETROIT, - - MICH.